McGraw-Hill DIGEST

eport to Management

lanned Maintenance Program
leans Lower Product Costs 59
urope's 1949 Steel Outlook 15
ouse Is Cast in Box Form 18
lastics Becoming Important 32
lanning for Welded Design 36
ydrofac Raises Well Output 40
odern Industrial Safety 45
election by Cotton Varieties 57

178 ITEMS IN THIS ISSUE

AVIATION, TRANSPORT
ti-Detonation Injector 24
ash Uses Built-in Body 28
nload Plane in Flight 33
so: 21, 23, 31, 47, 49, 55, 58

CHEMISTRY, METALLURGY
sts High-Quality Iron 22
diodyes Locate Tumors 30
osphorus Combustion 35
so: 15, 23, 26, 28, 32, 47, 51

CONSTRUCTION
st, Cheap Field Surveys . . . 25
rought-Iron Lock Facing . . . 41
ops Beams Into Place 54
so: 11, 18, 38, 39, 47, 49, 51

ELECTRICITY, POWER
Survey Reveals Power Trend . . 27
Develops New Transducer . . . 31
Sealed Beam Lamps for Street . 55
Also: 20, 21, 30, 39, 48, 50, 54

ELECTRONICS, RADIO
Marks Harbor Lanes 25
Eriscope Camera Tube 33
Electronic RPM Counter 56
Also: 30, 38, 39, 44, 48, 51, 54

FOOD PROCESSING
Cleans Vined Peas 22
Prevents Mold on Citrus 34
Browning Inhibitor Unsafe . . . 58
Also: 12, 20, 28, 30, 39, 42, 50

MECHANICAL DESIGN
Tests Strains in Rubber 20
Torque Tests 44
Variable-Speed Marker 50
Airplane-Type Auto Brake . . . 54
Unusual Elastic Properties 56
Also: 16, 21, 34, 42, 49, 51, 54

METALWORKING
Good Design for Die-Castings . 16
Jump-Cut Tool Saves Time . . . 24
Regenerates Pickle Liquor . . . 29
Repairs Cracked Column 38
Extends Fatigue Life 47
Also: 12, 22, 26, 31, 35, 44, 58

MINING, PETROLEUM
Island Mining With Shakers . . 21
Coal Mine Conveyor Belts 52
Mountain-Top Oil Drilling . . . 55
Also: 12, 23, 29, 38, 40, 51, 56

PLANT MANAGEMENT
Industrial Accidents Up 22
Modern Industrial Safety 45
Small-Plant Cost Reduction . . 47
Also: 26, 28, 34, 38, 43, 55, 58

TEXTILES
New Resin-Curing Range 42
Variables of Padding 44
Rubber Knit-Goods Problem . . 46
Also: 11, 23, 41, 48, 49, 57, 58

What every new Esso Tanker means to you

If you are a farmer *you see better crops.*
If you are a housewife *you see more convenience.*
If you are a businessman *you see better transportation.*

Every day the world consumes more than *9 million barrels of oil—the biggest demand in history!* That is why every new Esso tanker means so much. The farmer needs petroleum products for fueling his tractors and other mechanized equipment. Petroleum helps the housewife with heating, cooking and cleaning. The businessman sees gasoline as the "life blood" of motorized transportation. To help meet it, the Standard Oil Company (New Jersey) and its affiliated companies are working night and day on a world-wide construction program.

Esso tanker fleets are being expanded. Despite wartime losses, they are already 14 percent larger than in 1939. New Esso tankers, half again as large as those in general use, are being completed—some with a speed as high as sixteen knots. New pipelines, refineries and storage tanks are also being built. When completed, this huge construction program will bring greater comfort and convenience to everyone, for . . .

Petroleum helps to build a better life

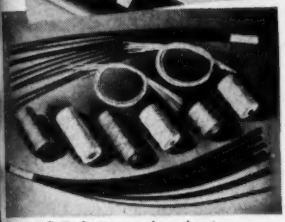
ESSO

STANDARD OIL COMPANY
(New Jersey)

Look to GENERAL ELECTRIC for

PLASTICS • INSULATING MATERIALS
PERMANENT MAGNETS

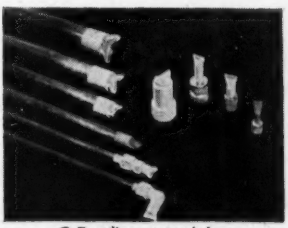
Laminated Textolite—many forms . . . for many uses.



G-E sleeving, cords and twines.

G-E . . . A Great Name in Chemistry

For 54 years General Electric has been developing and manufacturing chemical products. This experience has enabled G. E. to establish itself as a dependable leader in the field. G. E. has maintained this position by constant research, rigid quality control and maintenance of uniformity. For guidance in the fields of plastics, silicones, resins, insulating varnishes and metallurgical materials, LOOK TO G. E.! CH-94



G-E sealing caps and sleeves.

Permanent magnet materials.

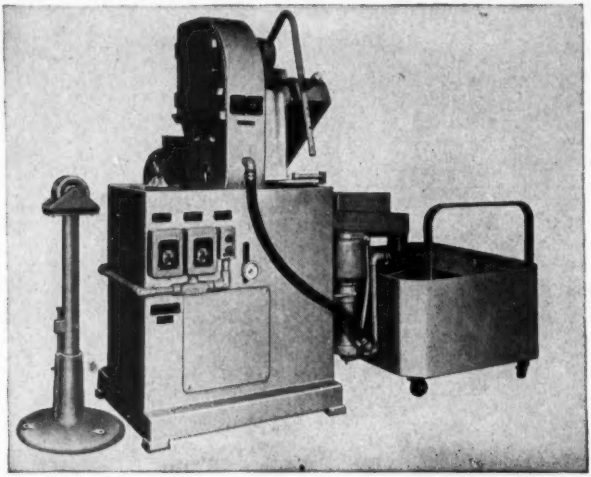
For more information consult your local G-E representative or write to the Chemical Products Section, International General Electric Co., Schenectady 5, N.Y., U.S.A.

Insulating Finishes.

GENERAL ELECTRIC

Products of the General Electric Co., U.S.A.

for ***Production...***
the CAMPBELL Automatic Cutting Machine



MODEL 223—Campbell's newest Wet Abrasive Cutting Machine.

CAMPBELL makes a full line of abrasive cutters. If you have a cutting problem, write and tell us: (1) the range of sizes, (2) kind of material, (3) length of cut off pieces, (4) length of stock before cutting, (5) tolerance for length of cut pieces and (6) hourly production requirement. With this information, CAMPBELL engineers can recommend production procedure and work up cost sheets for you.

Also makers of a complete line of Nibbling Machines.

SOME OF THE 137 ACCO PRODUCTS

AMERICAN CHAIN DIVISION
Weed Tire Chains, Welded & Weldless Chain & Attachments

AMERICAN CABLE DIVISION
Crescent Non-preformed Wire Rope, Tru-Loc Fittings, Tru-Lay Control Cable, Tru-Stop Brakes for Trucks and Busses, Tru-Level Oil Controller

CAMPBELL MACHINE DIVISION
Wet Abrasive Cutting Machines, Nibbling Machines

FORD CHAIN BLOCK DIVISION
Chain Blocks and Trolleys

HELICOID DIVISION
Helicoid Pressure Gages

HAZARD WIRE ROPE DIVISION
Lay-Set Preformed Wire Rope, Non-parell Non-preformed Wire Rope. "Korodless" (Stainless Steel) Yacht Rigging, Aircraft Control Cables

MANLEY DIVISION
Automotive Equipment for garages and service stations

MARYLAND BOLT & NUT CO.
Bolts and Nuts

OWEN SILENT SPRING CO., INC.
Owen Springs and Units for Mattresses and Furniture

PAGE STEEL AND WIRE DIVISION
Page Fence, Wire and Rod Products, Welding Wire

PENNSYLVANIA LAWN MOWER DIVISION
Great American Lawn Mowers.
Pennsylvania Motor Lawn Mowers.
Pennsylvania Jr. Lawn Mowers.

READING-PRATT & CADY DIV.
Valves, Brass, Iron and Steel; and Steel Fittings

WILSON MECHANICAL INSTRUMENT COMPANY
Rockwell Testers

WRIGHT HOIST DIVISION
Wright Chain Hoists, Electric Hoists

AMERICAN CHAIN & CABLE COMPANY, INCORPORATED

EXPORT DEPARTMENT: 230 PARK AVE., NEW YORK 17, N. Y., U. S. A.

JOHN F. CHAPMAN
Publisher

HARRY S. WHAREN
Editor

SHELBY McMILLION
Business Manager

J. H. McKEE, Jr.
Assistant Editor

Now! McGRAW-HILL DIGEST Offers You A More Complete Information Service!

The McGRAW-HILL DIGEST now offers you a greater selection of timely and important digests – not only from McGraw-Hill publications – but also from an increasing number of other distinguished industrial and business publications, all of them recognized authorities in their fields. The complete list of publications appears on the last page of this issue.

More Than 150 Important Digests Every Month...

Every month the McGRAW-HILL DIGEST offers you more than 150 digests selected on the basis of their potential usefulness in the fields of aviation . . . business, government, world trade . . . chemical and metallurgical engineering . . . construction . . . electrical appliances . . . electronics . . . food processing . . . hardware . . . manufacturing methods . . . merchandising, including product packaging . . . metal working . . . mining . . . motor cars . . . nucleonics . . . optometry . . . petroleum . . . plastics . . . power generation and distribution . . . science . . . steel . . . textiles . . . and others.

Additional Information When You Want It!

Under each item in the McGRAW-HILL DIGEST appears the original source of information. For example, "Prod Eng, D, 72" indicates that the complete article can be found on page 72 of the December issue of Product Engineering.

It provides an invaluable reference source wherever the publication referred to is available. If not available, then as a McGRAW-HILL DIGEST subscriber have only to address a request to our editors, or to our London office, and tear sheets of the original article will be sent to you without charge as long as they are available. Whenever you are interested in equipment described in the "New Products" section, we will forward your inquiry to the manufacturer with a request that additional information be sent to you.

How to Subscribe to the McGRAW-HILL DIGEST

If you are not already a subscriber to the McGRAW-HILL DIGEST, you will be interested to know that the following subscription agencies in most countries are in a position to transmit your instructions and remittance for you – or you can address them to McGraw-Hill International Corp., 330 W. 42nd Street, New York 18, N.Y., U.S.A.

DECEMBER, 1948
VOLUME 3
NUMBER 12

ABC

McGraw-Hill Digest is published monthly by McGraw-Hill International Corp. for circulation in all countries except the United States and Canada. Publication and executive offices, 330 W. 42nd St., New York 18, N. Y., U.S.A. James H. McGraw, Jr., President; John Abbink, Chairman of the Board; E. P. Warner, Vice-President and General Manager; J. L. Gilbert, Senior Vice-President; J. F. Chapman, Vice-President; George Quisenberry, Vice-President; Curtis W. McGraw, Treasurer; J. A. Gerardi, Secretary; J. C. Stark, Assistant to President; K. P. Bliss, Vice-President and Director of Advertising; J. E. Blackburn, Director of Circulation. *Subscriptions may be ordered through Director of Circulation, through local book dealer, or McGraw-Hill, Aldwich House, London, W. C. 2 (British only).* Subscription rates: $5 for 1 year, $8 for 2 years, or $10 for 3 years; single copy 50¢ (U. S. currency). Entered as second-class matter December 17, 1947, at the post office at New York, New York, under the Act of March 3, 1879.

How the Chase can facilitate your trade with the United States

In the flow of commerce among nations, the Chase National Bank provides facilities for export and import credits, payments and collections, money transfers and foreign exchange.

In the United States, The Chase maintains correspondent banking relationships with leading banks throughout the country.

Similar relationships exist with financial institutions in practically all commercially important centers throughout the world.

These international facilities are at your disposal. Your inquiry is cordially invited.

THE CHASE NATIONAL BANK
OF THE CITY OF NEW YORK

HEAD OFFICE: Pine Street corner of Nassau

Member Federal Deposit Insurance Corporation

OVERSEAS BRANCHES

London • Frankfurt/Main • Heidelberg • Stuttgart • Tokyo
Havana • San Juan • Panama • Colon • Cristobal • Balboa
Offices of Representatives: Mexico, D. F. • Buenos Aires • Rome • Cairo • Bombay
THE CHASE BANK: Paris • Shanghai • Hong Kong • Tientsin

Now.. REMINGTON RAND PRESENTS A *Command Performance*

STARRING THE NEW "97" AUTOMATIC

***Printing* CALCULATOR!**

• Businessmen the world over wrote the script for *Command Performance*. Told us what their ideal calculator would be. "Give us larger capacity," they said, "more speed, quieter action—simple, automatic operation. Above all, we want the invaluable *proof* on the printed tape."

Four years of design, test, improve and re-test set the stage. Then came business previews. From everywhere came rave notices for "the calculator that businessmen built." Now, we proudly raise the curtain on the new "97" automatic Printing Calculator!

★ **PRINTED PROOF!** Every factor and answer printed on the tape. Immediate proof of accuracy, a permanent record.

★ **AUTOMATIC DIVISION!** Simply enter figures and touch divide key. The "97" automatically completes and prints the problem, automatically clears.

★ **RAPID MULTIPLICATION!** New "short-cut" feature reduces cycling time up to 50%. Single action multiplication is fast, easy, foolproof.

★ **LARGE CAPACITY!** The "97" handles up to a trillion dollars as easily as pennies. Sized for your needs!

★ **LISTS, ADDS, SUBTRACTS!** The versatile "97", with its printed tape is a calculator and an adding machine too. Saves time, cuts costs.

★ **10-KEY TOUCH CONTROL!** No finger-groping on the compact 10-key keyboard. Use touch method right away.

★ **QUICK, QUIET, ELECTRIFIED!** Sound-proofing cushions mute motor action. Completely electrified—prints every factor and clears automatically.

For complete information, write to Remington Rand Inc., Export Div., Dept. A-12, 315 Fourth Ave., N. Y. 10.

Remington Rand

PRINTING 97 CALCULATOR

315 FOURTH AVENUE, NEW YORK 10, N. Y.

Problem: Consolidated Textile Co., Lynchburg, Virginia, make drills (pocket material), sheeting and print cloth. They had trouble doing a uniform job of slashing (impregnation of yarn with starch, oils, and water to condition it for weaving.) Excessive breakage of warps caused loom stoppages, resulting in lost production. Heavy steam consumption cost money. High starch consumption, besides being costly itself, caused excessive shedding of starch and fiber, resulting in loss in cloth weight and an expensive housekeeping problem.

Solution: Taylor Application Engineers recommended a *completely automatic Taylor Slasher Control System*, controlling all four slashing functions: size cooking, storage, size box level and temperature, and slasher cylinder temperature and pressure. Slashing became a fully coordinated process instead of a series of unrelated steps.

Results: Mr. J. H. Burgess, Ass't Supt. at Consolidated's Lynchburg plant writes, "With these controls we have reduced the amount of starch used, reduced shedding in weave room, increased our efficiency and the cloth weights have been more uniform."

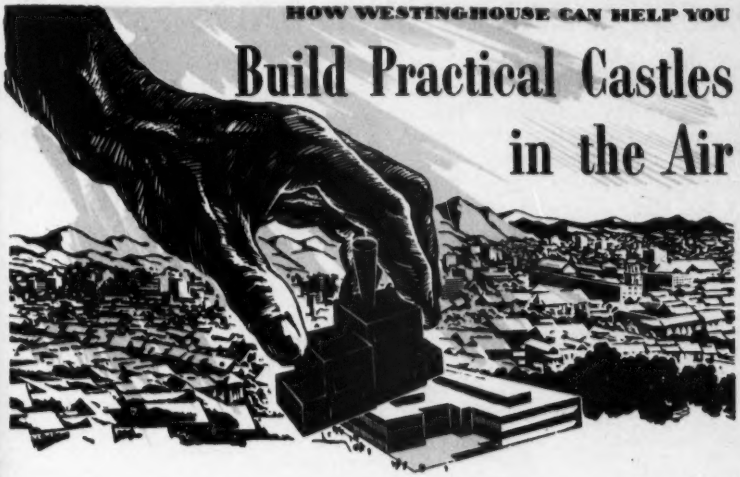
Moral: As a result of this successful installation, Consolidated put a similar system in their Shelby, North Carolina, plant. Since then over 100 slashers have been thus equipped. Taylor Controllers are adaptable to almost any phase of industrial processing. Recommendations for their application come from a staff of engineers with years of experience solving processing problems.

Taylor sales and service facilities are available practically everywhere. Call your nearest Taylor representative or write Taylor Instrument Companies, Rochester, N. Y., U.S.A., or Short & Mason Ltd., London, England.

TAYLOR INSTRUMENTS MEAN ACCURACY FIRST

HOW WESTINGHOUSE CAN HELP YOU

Build Practical Castles in the Air



The story of "Building-Block" engineering, the world's newest tool for industrial and civic development.

Ever watch your child playing with blocks? . . . Notice how swiftly his fingers bring bridges and castles, factories and cities into being? He is applying imagination to a fundamental unit, the block.

Today engineers in many fields are using the same principle based on standard functional units. These "building-block" units combine with others to meet varying situations. If you have seen a pre-fabricated house, or a modern electrical kitchen, you know how the principle has been put to work. But few know of its application by Westinghouse to power generation and distribution systems . . . to radar, lighting, airports, complete industrial plants and communication equipment. You will feel the effects of "building block" engineering in the way one Westinghouse product teams up with another, in simpler construction, easier maintenance, lower costs and in a greater range of product usefulness.

Development of the first Unit Airport, the first Unit Power Plant, the first Unit Cement Plant and many other standard functional units has made Westinghouse a leader in bringing you this newest engineering tool.

Let Westinghouse "Building-Block" Engineering help you realize the goals you envision. Whether you are developing a business, a city or a nation, Westinghouse products can help. For details contact the nearest Westinghouse distributor or write Westinghouse Electric International Company, 40 Wall Street, New York 5, U. S. A.

This advertisement, one of a series, tells only part of a far larger story. For many years we at Westinghouse, who are your friends and neighbors, have served the world electrically. But today our more difficult mission is to use not only our electrical products, but our resources, our facilities and our counsel in helping to rebuild world economies.

Westinghouse *Electrical Products for World Progress*

BAGS . . . CARTONS . . . BALES . . . DRUMS

They all look alike to Clark Fork Trucks and Towing Tractors. Whether they are handling cement, molasses, cotton or lumber, Clark machines combined with palletization methods and attachments are achieving notable records of low-cost operating efficiency throughout industry — adding handsome profits through speedier handling, by multiplying storage space, by reducing accident rates, by releasing unskilled labor for more productive skilled and semi-skilled assignments.

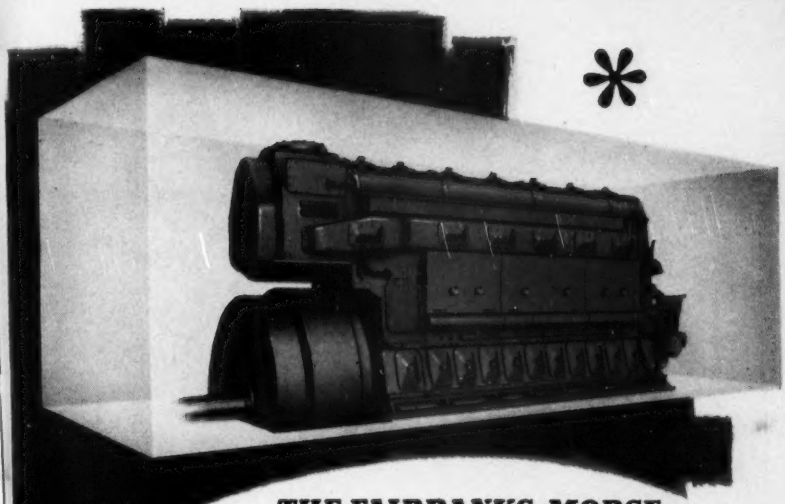
THE CLARK WAY IS THE PROFIT WAY TO HANDLE MATERIALS

There's no charge—no obligation—in finding out how you, too, can utilize these thoroughly proved and profitable methods. Recommendations for your plant are available for the asking.

REMEMBER: There's a Clark machine and attachment for your every handling need!

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

CLARK EQUIPMENT COMPANY • EXPORT DIVISION
BATTLE CREEK 73, MICHIGAN, U. S. A.
Distributors in principal cities throughout the world



THE FAIRBANKS-MORSE MODEL 38 O.P. ENGINE

More Power PER FOOT OF FLOOR SPACE!

Consider this: a single Fairbanks-Morse Model 38 Opposed-Piston Engine can put up to 1600 horsepower to work for you ***in almost half the floor space required by other heavy-duty Diesel engines of the same horsepower.***

The Model 38 Offers Basic Advantages of Opposed-Piston Design

Two pistons in each cylinder, activated from a common central combustion area . . . no cylinder heads, no valves . . . a minimum of moving parts . . . less weight . . . more power per foot of floor space—more economy in sustained heavy-duty service!

Doesn't this suggest a way to gain that added kw-h output without remodeling or expanding your present plant floor space facilities? For full details, see your nearest Fairbanks-Morse representative.

Fairbanks, Morse & Co., Inc. Export Division: 80 Broad St., New York, N. Y., U. S. A. In Mexico: Fairbanks-Morse De Mexico S. A., Balderas No. 146, Mexico, D. F.

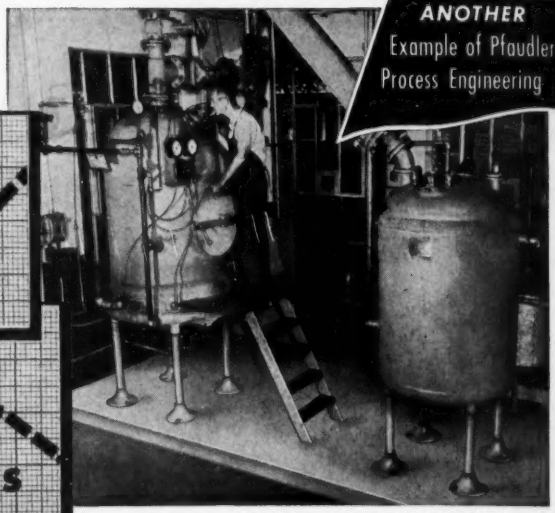
DIESEL MOTORS • ELECTRIC MOTORS • GENERATORS
PUMPS • WATER SYSTEMS • FARM EQUIPMENT
WINDMILLS • SCALES • RAILROAD EQUIPMENT

FAIRBANKS-MORSE

A name worth remembering

ANOTHER
Example of Pfaudler
Process Engineering

IMPROVE
QUALITY
AND
LOWER
COSTS



Pfaudler vacuum distillation assembly for making fruit concentrates at Limpert Bros., Inc., Vineland, N. J.

by accurately controlling the process

Accurate control of the process is the key to better food products at lower cost. Here is a typical example—a vacuum distillation process for making fruit concentrates.

Water is quickly removed by means of low temperature, high speed evaporation. Products are uniform in quality, heavy in body, natural in color and flavor. They retain all important natural characteristics. They sell better.

By saving time, by eliminating product losses through carmelization, off flavor, or loss of color, costs have been reduced.

Pfaudler engineers can help you obtain better products at lower costs by designing and building equipment that gives you accurate control throughout the process, whether your problem involves foods, chemicals, drugs, pharmaceuticals, plastics, synthetic rubber, etc.

This know-how is at your service. Write today, giving full information about your needs. Your inquiry will receive prompt attention.

Pfaudler

THE PFAUDLER CO., ROCHESTER 3, NEW YORK
ENGINEERS AND FABRICATORS OF CORROSION RESISTANT PROCESS EQUIPMENT
Glass-Lined Steel · Stainless Steels · Nickel · Inconel · Monel Metal

BUSINESS TRENDS

GENERAL BUSINESS CONDITIONS in the United States during 1949 will have world-wide effect, both economically and politically. Here is a forecast on what to expect in the light of the present situation. But if war comes between major powers (which looks doubtful in the near future), this analysis must be considered void, as it assumes peace-time conditions.

During the first half of 1949, business activity is expected to continue at the same high level as throughout 1948. A forecast beyond that period is difficult to make and to justify, but a number of economists believe that total business for all of next year may be somewhat smaller than for this year.

Studies of factors that might affect general business activity have caused many analysts to reach the conclusion that business at some time during 1949 is facing a readjustment, although possibly only a minor one. The over-all boom has reached an advance stage, probably beyond its top point; there are few indications that it can continue indefinitely.

Most economists now look for a correction—a general decline in the latter half of next year—followed by a dynamic upswing in 1950 after business factors are once again on a sounder basis with boom excesses eliminated. If the readjustment is for any reason delayed, general business will face a more violent correction, recession, or even worse in the future.

Weaknesses are already evident in several industries. Textiles, shoes, and luxury goods (liquor, cosmetics, furs) are notably weak. Urgent demand is over for many products, competition and price cutting have once again reappeared in domestic markets, and exports are declining.

Capital expansion in 1949 will have a most important influence on business conditions. Present signs indicate that expansion in the manufacturing group, as well as in mining and commercial enterprises, is falling off, with most large postwar expansions being now completed or in final stages of completion. Many companies are now postponing construction of new plants or additions because of the extremely high building costs. Work however is going ahead on those plants, the completion of which will mean substantially lower products costs.

But railroads and utilities are expected to continue heavy spending. House building should continue at today's pace. And government spending for the military and for public works will probably increase. Unless some unexpected economic calamity strikes, or unless business managements let unrealistic pessimism affect their decisions (which does not seem likely in any general respect), indications are that in 1949 the construction industry will do a volume of business even larger than the huge 1948 total of $18½-million.

Government spending is the big unknown factor. Perhaps more armament money will be voted by Congress. Lend-lease too will command serious attention

next year. Even now it is under discussion for January or February consideration. Even though both are carried through, their effects will not be felt until late next year.

The general level for capital-goods activity should continue high. Demand for steel is not expected to slacken. Even though steel supplies will probably be greater in 1949, domestic and export demand will not be satisfied—at least for the first six months.

The steel industry, some business analysts believe, will move into a seller's market in the latter half of next year. But steel-industry officials say, "No"—that the strong demand (and shortage) will continue as long as foreign aid, either economic or military, continues to siphon off steel from the domestic economy.

Here again, the question is how military requirements may compensate for lower plant and equipment expansion. But as far as steel exports are concerned, this will bode no improvement early in the year. Government officials indicate that over-all quotas will not be changed much in the first quarter of the new year.

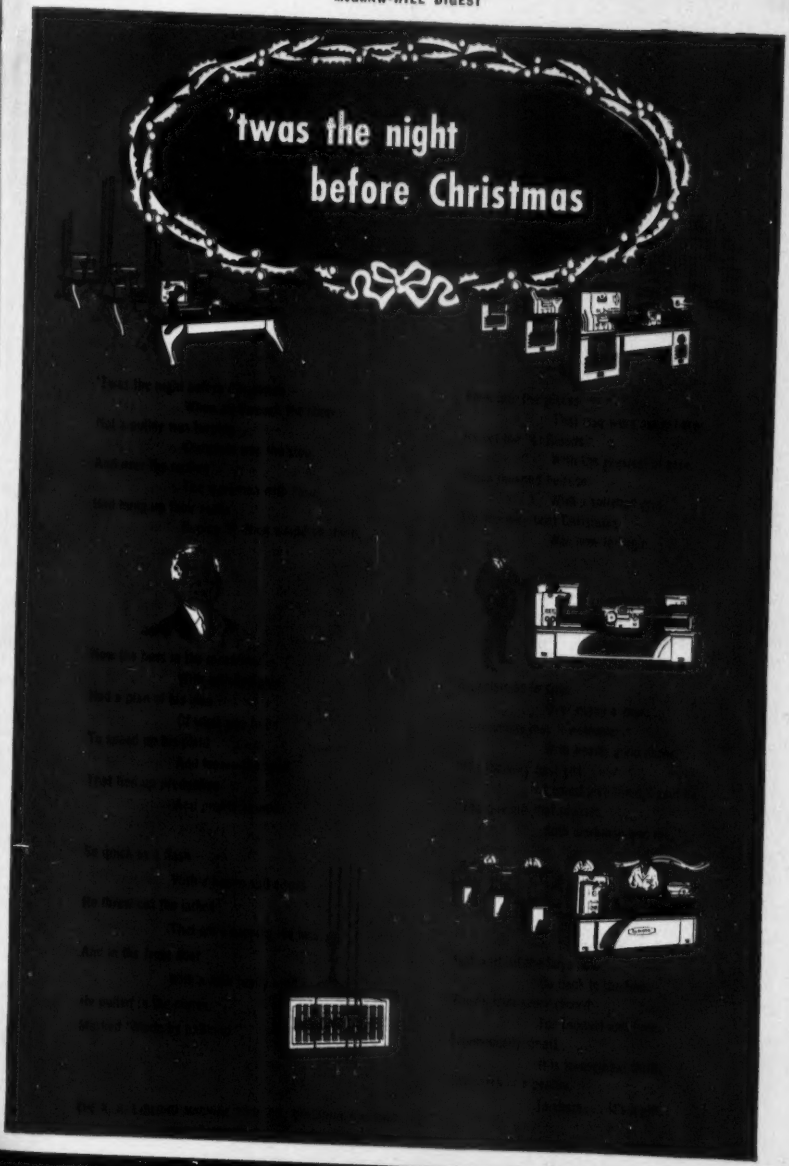
Prices for the whole of 1949 may be a critical factor, determining, for instance, whether consumers will be priced out of various markets. But for at least the first quarter of the year, U. S. business foresees a fairly stable price level. The broad readjustment underway this year is slowing down. During this period, farm prices have fallen about 10%; industrial prices have risen 5%.

October domestic raw material prices were at the lowest average level since June, 1947. The outlook is for further reduction in farm prices, but only to modest dimensions because most U. S. farm prices are held up artificially by the government's support program. Government officials look for a decline of 3-5% in food prices within the first half of 1949.

The outlook for industrial prices, on the other hand, is not too clear. Although some analysts expect a continuing rise, others see the general rise as being checked —at least until effects of next year's possible wage increases are felt. Occasional increases are still being announced, but in no wholesale manner as in the past.

Iron and steel are priced 12% higher this year. Increases are still underway. Pig iron has just been increased $3 to $4 a ton; alloy-steel prices have been raised again by qdding on "extras" of about $5.50 a ton and more. Soon this situation should be stabilized. But a 1949 wage increase (due for discussion in July) would change this outlook completely and mean another round of higher steel prices. Steel-industry officials leave no doubt on this point.

Non-ferrous metal prices also have been creeping higher, and the end is not yet in sight. Machinery, pulp and paper, chemicals, and petroleum products now appear stable in price. Prices of cotton goods have leveled off from recent declines, but next year may see further reductions. Woolen and worsted fabrics have had recent advances, but in the first half of 1949, prices likely may start downward. The whole future, long-term U. S. price situation may be summarized briefly—lower than today's present level but relatively high compared with prewar.


'twas the night
before Christmas

Take your pick from 15,000 Monsanto industrial coatings

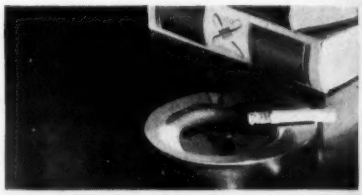
The next time you see a lovely feminine hand, you are probably looking at a Monsanto nail lacquer of brilliant color, high gloss and good adhesion. This is only one example of thousands of Monsanto industrial coatings, each of which is scientifically designed for the product to which it is applied.

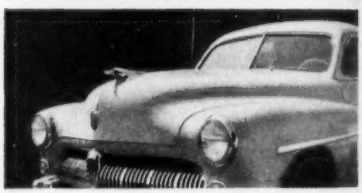
Beyond this, Monsanto also offers a wide range of plasticizers and resins, nitrocellulose solutions, specialty lacquers, flatting agents, ethyl acetate, thinners, lampblack, masking and anti-skinning agents. For complete information, write . . . or consult your nearest Monsanto representative.

Santolite* MHP... A water-white thermoplastic resin which imparts better gloss, clarity, hardness, oil resistance and light stability to many decorative, utility and protective coatings. Compatible with most of the generally used film-formers, including vinyl resins, nitrocellulose, ethyl cellulose.

Resimene*... Resins designed for a wide range of baking formulations for enamels. In addition to wide compatibility, the Resimenes are characterized by abrasion, alkali and solvent resistance; high speed of cure; color retention; added storage stability; high gloss; good weatherability. They will definitely increase the production speed of coatings.

*Trade-mark registered in the U. S.





These are but a few examples of the hundreds of chemicals and plastics developed by Monsanto. With all of these products, manufactured in 28 different plants located throughout the world, Monsanto is making it possible for industry to turn out new and better things for the general public.

SERVING INDUSTRY WHICH SERVES MANKIND

MONSANTO
CHEMICALS AND PLASTICS

MONSANTO CHEMICAL CO.
St. Louis 4, Missouri, U. S. A.

Monsanto Chemicals Ltd., London
Monsanto (Canada) Ltd., Montreal
Monsanto (Australia) Pty., Ltd., Melbourne

Representatives in Principal Cities of the World

December 1948 • McGraw-Hill DIGEST • Volume 3 Number 12

Appleby-Frodingham Steel Co.'s new blooming mill is important to . . .

Europe's 1949 Steel Outlook

Outlook is bright as prewar production is reached. First half of '48 ahead of '47 output. Industry must be placed on a secure footing

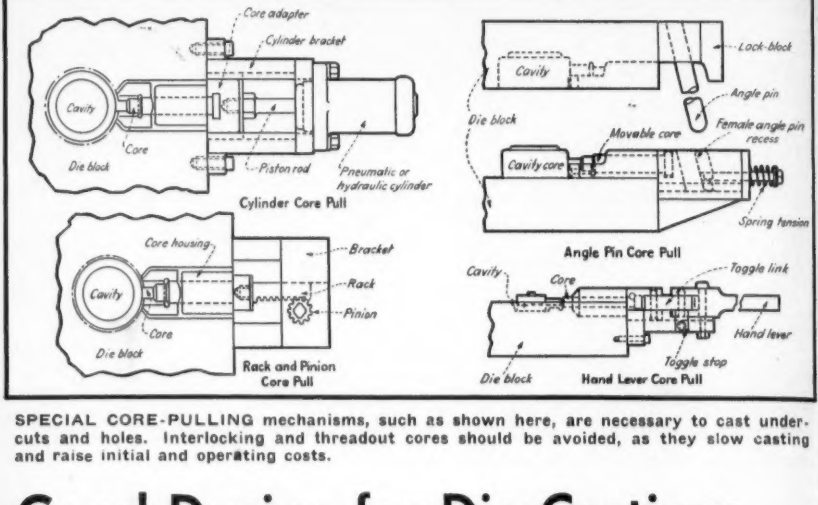
FIGURES of the Organization for European Economic cooperation on European steel production for the year ending June 30, 1949 are most encouraging. Production should reach a point 50% above the 1947 figure—in the neighborhood of 50-million tons of ingot and castings. This would place the production back on a pre-war footing. Such production will help both Europe's industrial and trading positions.

Western Germany's production is about half what it was prewar, but increases in other countries more than offset the disparity in German output.

Barring unforeseen stoppages, the 50-million ton goal should be reached. Output is rising rapidly in Western Germany, Britain, Belgium, and Luxembourg. In the first half of 1948, production was at the rate of 44-million tons annually. This was 27% ahead of the preceeding year and 6% above the goal.

Mr. Clarance B. Randall, vice-president of Inland Steel Co.—just back from a long tour of European steel facilities for ECA—says the job of promoting Europe's steel output is one of the biggest jobs facing ECA. The industry must be brought to its highest possible producing level, with existing facilities, as quickly as possible. It is not a problem of raised production alone. Plants must be placed on a footing that will permit them to continue production after American help is gone.

The Ruhr industry should be based on the supply of indigenous raw materials —ore from Lorraine and coal from the Ruhr. Psychological barriers to such a basis are great but should be overcome. Heavy dependency on Swedish ores makes more critical shortages of ore in other areas and builds up a false potential for the years when demand is not so great.—Business Wk, O 23, 121



SPECIAL CORE-PULLING mechanisms, such as shown here, are necessary to cast undercuts and holes. Interlocking and threadout cores should be avoided, as they slow casting and raise initial and operating costs.

Good Design for Die-Castings

Important factors in design include choice of material, size and shape, dimensional tolerances. Cost and ease of production depend on these factors

DIE-CASTING permits a flexibility in design that is lacking in many other methods. But to achieve flexibility requires knowledge of the major design factors.

Materials to be die-cast must have low melting points; they include tin, lead, tin-lead alloys, and low-melting-point brass alloys. Sizes of die-castings range up to 25 lb. in zinc or its volume equivalent in other metals.

Shape of parts should be made as simple as possible to allow use of the most easily constructed die, to speed production, and to facilitate assembly and finishing operations. Surfaces having undercuts should be avoided, whenever possible, by redesign. Certain undercut parts can be cast by using loose pieces, called slides, that eject freely with the casting.

Draft on a part determines whether it can be ejected freely from the die. Narrow draft limits (see table) prohibit casting; for example, a cylindrical part having a draft of only 0.001 in. per in. cannot be cast, unless draft is given it and then machined to proper shape.

Wall thicknesses should be as uniform as part design permits. When change in thickness is necessary, transition must be gradual to minimize stresses set up by unequal cooling rates. Furthermore, wall sections should be kept as thin as possible, because addition of weight does not result in proportionate increase in strength and heavy sections may cause porosity.

But sections should not be so thin as to restrict flow of metal into the die. Recommendations are given in the table. Thus it can be seen that it is difficult to cast products which, for example, were previously made from sheet materials less than 0.050 in. thick.

External and internal threads can be cast. External threads should be fairly coarse and have pitch diameters not less than ¾ in. Flash at parting line must be trimmed off in cleaning.

Casting internal threads requires extremely expensive dies incorporating a threadout core, and is slow. It is more economical to cut threads into parts after casting, unless part shape is so irregular that chucking or fixture mounting for a machining operation is unreasonably difficult.

Die-casting can often be adapted to specific requirements by using inserts. They are usually made of materials, both metal and nonmetal, dissimilar to the die-casting alloy. Whenever dissimilar metals are used, the designer should explore possible electrolytic corrosion.

Because of high shrinkage of die-cast materials, the bond between insert and casting is generally strong. But good practice is to strengthen the bond by knurling, undercutting, or grooving the anchor end of the insert.

The designer should always watch bosses and studs carefully. Bosses should be heavy enough to furnish sufficient metal around a hole to avoid local stresses, but not so heavy as to encourage porosity. Studs to be threaded should not be cast, because threading produces a notch effect which weakens the structure. A boss that can be tapped is stronger and more satisfactory.

The designer too should always consider the coring. He should strive for use of cores of the simplest possible shape. Rectangular cores are the simplest to make and use. But regardless of shape, cores must have sufficient taper to allow extraction.

When appearance of a finished part is important, the designer should avoid plain flat areas if possible. Such areas are difficult to cast without imperfections, and should be slightly curved or given a simple decorative design. To avoid shadow marks, sections should be made 0.100 in. or more in thickness and underlying bosses or ribs should not exceed 80% of section thickness. If this is impractical, a surface design will hide blemishes and other imperfections.—Prod Eng, O, 86

Approximate Dimensional Limits for Die-Castings

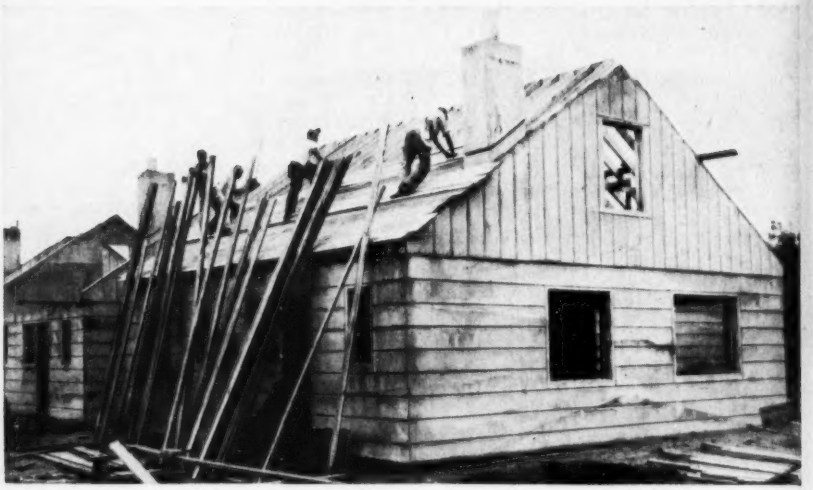
	Zinc Alloy[1]	Aluminum and Magnesium Alloys	Copper Alloy (Brass)
Minimum wall thickness, large castings, in.	1/16	0.085	1/8
Minimum wall thickness, small castings, in.	0.030	0.050	0.050
Tolerances in solid die section[2]			
On any one dimension, in, in. per in.	0.001	0.0015	0.003
Minimum on any one dimension, in.	0.0025	0.003	0.005
Cast threads, external, max. number per in.	24	20[3]	10
Cast threads, internal, max. number per in.	24[4]	none[3]	none
Cored holes, min. dia., in.	0.030	3/32	3/16
Minimum allowable draft, in. per in. of core length	0.003	0.015	0.020
Minimum allowable draft, in. per in. of cavity depth	0.005	0.010	0.020

[1] Tin and lead alloys are die-cast to approximately the same dimensional limits as zinc alloys.

[2] Applies only to dimensions across solid portions of die. When dimension is across parting line or between points controlled by parts of die having relative motion, wider limits must be allowed.

[3] Small aluminum die-castings having walls only 0.040 in. thick and threads as fine as 24 per in. have been produced in quantities.

[4] If cheaper than tapping. Fine internal threads are nearly always tapped.



DWELLING is finished conventionally after . . .

House Is Cast in Box Forms

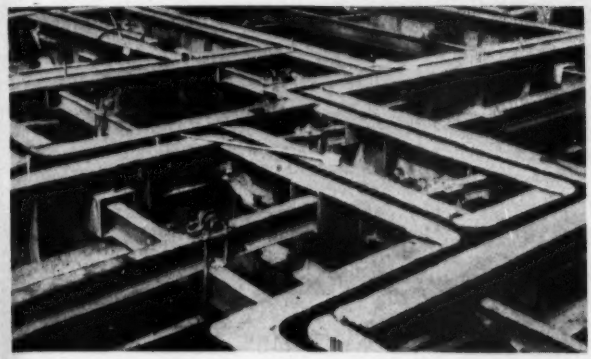
Twenty-three forms used to pour a 5-room, 900-sq. ft. house and garage. Walls are sandwich-type; heating is by radiant coils in 6-in. floor slab

COMPLETE HOUSE with double walls and partitions is cast in place by Callan Builders, Inc., at a 150-house project in Port Washington, Long Island. Cost reduction was the incentive for this revolutionary house-construction method. Houses are five-room units with approximately 900 sq. ft. of living space and a 200-sq. ft. garage.

Walls are 7-in. thick sandwiches, composed of two 3-in. thick concrete slabs sandwiching a 1-in. insulating sheet. Only 23 form units are used for the mono-poured dwelling. Seven forms are needed for the exterior wall face; four forms are used for the gables. Chimney is formed by one core, and the eleven remaining cores divide the interior living space.

Callan uses one core for each of the following: living room, dinette, kitchen,

ANGLED FACING on outside form gives a siding effect to concrete exterior



CROSS LIFTING beams rest loosely in boxes so units can be collapsed for stripping

two bedrooms, bath, utility room, stair well, hall, closets, and garage.

Forms are of welded $\frac{5}{16}$-in. steel sheets with $\frac{1}{4}$x6- and $\frac{1}{4}$x8-in. bracing on 2- or $2\frac{1}{2}$-ft. centers. Faces are highly polished, resulting in a smooth surface that will take paint or wallpaper directly without prior finishing.

Forms, with 8-in. radius corners, collapse easily in stripping. A line of 3-levered clamps across a reinforced beveled joint opens or closes form unit. Similar clamps operate steel box-outs for windows.

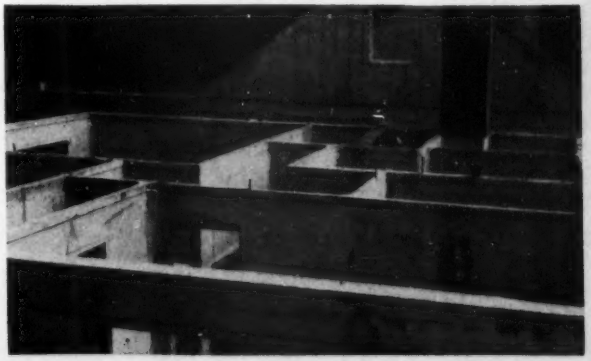
Forms are a maximum 30x8$\frac{1}{2}$ ft. and weigh up to 5 tons. They are placed and removed by crane (opposite page).

Radiant heating, with coils placed in the 6-in. concrete floor slab, is used. The heating slab rests on a 14-in. by 4-ft. continuous footing.

No. 6 6x6-in. wire is used for wall reinforcing. Door and window openings have an additional $\frac{1}{2}$-in. rod for reinforcing. Insulating board is vapor-proofed before being placed.

Pouring takes 3 hr. using high-early strength concrete mixed enroute to project in transit-mix trucks. Hopper rests on top of forms and the mixed concrete is placed through a 3-in. rubber hose.

Mix is 1–2–3 mix with 5 gal. of water per bag of cement.—Cons Meth, O, 42



WALLS and partitions are ready for decorating; no additional finishing is needed

Freeze-Concentration in Pilot-Plant Stage

Recently developed process concentrates fruit and vegetable juices, milk, coffee, wine, and beer by controlling ice-crystal growth. Now in pilot-plant operation at Commonwealth Engrg. Co., it causes ice crystals to grow in several stages and in a counter-current relation to flow of juices.

The largest crystals are in contact with most dilute and least viscous liquid. A simple centrifuging effects nearly complete separation. The machine is arranged with a cascade of four semi-cylindrical metal troughs, each provided with a screen which separates suspended crystals.

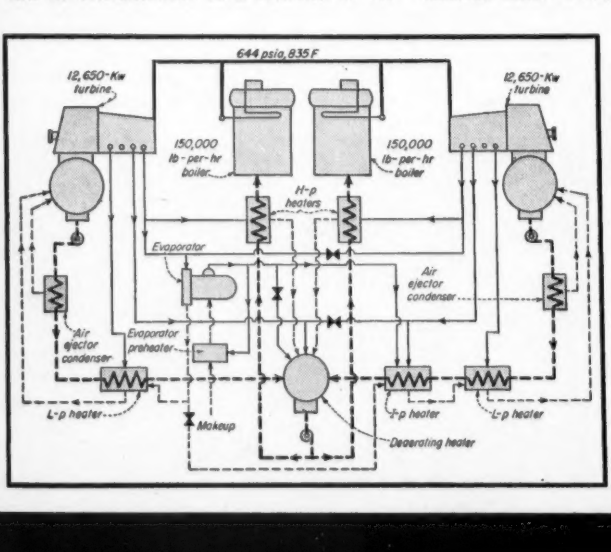
Advantage of process is the small loss of valuable dissolved material. Possible applications appear numerous. In addition to fruit juices, wines and cordials have been concentrated to about 80 proof. Beer can be raised to 40% achohol content, which may conceivably change distribution methods. Coffee also can be concentrated to a fraction of its original bulk; it might possibly be marketed as a sirup or converted to crystalline form by conventional methods.—Food Ind, O, 82

Tests Strains in Rubber

A new device developed by U. S. National Bureau of Standards measures strain in vulcanized rubber at a definite time after application of a predetermined stress. This new technique combines a higher degree of reproductibility in measurement with an accuracy not previously possible.

Design features are: (1) observation of bench marks when they are essentially at rest; (2) use of freely suspended weights to attain stress; (3) increase in bench-mark distance to four times that used for usual dumbbell-shapes.

The tester itself is made in two parts, built into a supporting table. The upper part includes a mechanism for stretching the specimen, an optical system for time cycle controller, and a keyboard for selecting loads. The lower part of the tester is the mechanism for applying the selected load.—Prod Eng, O, 165



UNIQUE BOILER-TURBINE HOOKUP Permian Basin plant of Texas Electric Service Co. is a model of advanced practice in outdoor design. Only control room, auxiliary room, and turbine-generators are enclosed. Steam and water connection system is unusual. Both boilers feed steam to header supplying both turbines. A single deaerating heater and intermediate-pressure closed feedwater heater, fed by 8th-stage extraction steam, avoid unbalancing steam extratced from two units.—Power, O, 86

LIGHT, LOW-COST CAR

Expected to sell between $500 and $750, this 10-hp. "Airway" weighs but 600 lb. Top speed is 50 mph.; wheelbase is 100 in. Body and most of the chassis are aluminum. Engine is rear-mounted to eliminate driveshaft. Front seat seats two comfortably, with room behind for baggage or a back seat. Car is made by Airway Motors, Inc. — Motor Age, S, 55

Duct Tie Provides More Flexible System

Power at new plant of Kingston-Conley Electric Co. is distributed by six parallel 570-ft. duct runs. Each of two 600-kva. transformers, located on each side of center of duct runs, thus feeds six 285-ft. duct lines.

Rather than tie the two 285-ft. runs together with a dummy section in which jumpers could be installed when needed, the contractor installed a switch fuse adapter section in the center of each duct run. A duct section adjacent to each switch adapter has an expansion joint.

Should one transformer fail, any part of its load can be transferred to the second unit by merely closing the adapter switch tie. Repairs could then be made without serious curtailment of plant production.—Elec C&M, O, 75

Island Mining With Shaker

Where overburden is too thick—65 to 150 ft.—to make strip mining pay, Penowa Coal Co. has employed shaker conveyors, duckbills, and conveyor belts to move 1,500 tons of coal per 2-shift day. Mother belts load trucks which move coal to preparation plant.

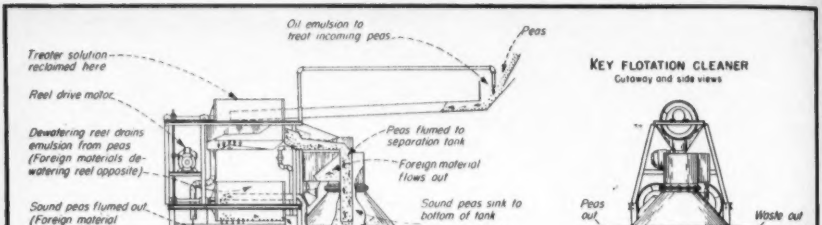
Entries are driven across the island (1,800 ft.) and rooms are mined by duckbills loading mother belts. Entries consist of three headings 12 ft. wide on 62-ft. centers. Rooms are necked out on 35-ft. centers. Duckbills discharge direct to conveyors placed in center heading. Conveyors in the outside headings discharge over belt side through 90° angle troughs back of drivers.

Method is equal to usual panel costs; getting maximum coal out with minimum roofing is possible.—Coal Age, O, 86

Gravity-Flow Paint Brush

Gravity feeds a new paint brush developed by former bridge-painter and steeplejack R. C. Engren. Flexible hose from paint bucket valve feeds paint to hollow brush heel. Paint flows into bristles, flow being checked by bucket valve.

Contractors report up to 50% increase in per-man-hr. production. Average man can save 38% in time and paint. Bristle saving is substantial. Air Flow Brush Co. will manufacture Engren's brush.—Science Ill, N, 71


Oil emulsion to treat incoming peas
Peas
Treater solution reclaimed here
Reel drive motor
Dewatering reel drains emulsion from peas (Foreign materials de-watering reel opposite)
Peas flumed to separation tank
Foreign material flows out
Sound peas flumed out (Foreign material opposite side)
Sound peas sink to bottom of tank
Foreign materials carried up and out
Oil emulsion treatment reservoir
Separator emulsion to perforated cone
Separator emulsion reservoir
Froth flotation pump
Oil emulsion treater pump
Product flow
Solution flow
KEY FLOTATION CLEANER
Cutaway and side views
Peas out
Waste out

FROTH FLOTATION CLEANS VINED GREEN PEAS

Umatilla Canning Co. uses three Key froth flotation cleaners to separate extraneous matter from vined peas. First step consists of wetting peas with an oil emulsion and draining in a de-watering reel. Peas next drop into a hopper and are flumed in froth emulsion down a conductor pipe inside separator tank. Froth emulsion is oil-in-water and a detergent (usually sodium lauryl sulphate). Peas, lacking buoyancy, sink to bottom of tank and are discharged, while foreign matter is carried out through outlet port to a waste recovery bin.—Food Ind, O., 76

Casts High-Quality Iron In Permanent Molds

Judicious metallurgical control in the foundry of Eaton Mfg. Co. means constant checking, from raw materials charged to cupola down to spout metal and slag. To obtain required iron analysis, Eaton takes slag samples every half hour to observe color of fractures. Bottle green is considered normal. If lighter, silica rock is added; if darker, fluorspar or fused soda ash.

Typical charge, in lb., shows: 1,300 of pig iron (12½% basic, 3–5% silvery, balance foundry or malleable), 1,300 return iron, 400 cast scrap, 420 coke, 86 limestone, 10 silica, and 2 fluorspar. The silica in form of silica pebbles reduces hot erosion of cupola lining. Typical slag analysis is: 49% SiO_2, 30.2% CaO, 18.33% Al_2O_3, 2.25% MnO, and 1% Fe_2O_3.

Analyses on iron at the spout are run every 90 min. to check carbon, manganese, and silicon. Phosphorus and sulphur are checked frequently throughout heat. Final iron analysis runs about 3½ C, 2½ Si, 0.70–0.90 Mn, 0.09–0.13 S, and 0.20–0.25 P.

Tapping temperature for permanent-mold casting is close to 2800° F., and pouring temperature from 2500 to 2600° F.—Foundry, O, 82

Industrial Accidents Up

Although industrial accidents in the United States increased 1% last year over 1946, it looked like industrial safety programs were paying dividends. The 1% increase was during a year of great industrial expansion. Largest increase in accidents was in mining and quarrying (15%) and construction (9%) industries.—Business Wk, S 25, 102

Worsted, Nylon-Staple Yarns Spun on American System

Spinning of worsteds and nylon-staple yarns on modified Whitin units at Delaine Worsted Mills extends the use of the American system to fine yarn counts and long staple lengths. The relative low cost of worsted manufacture is maintained; large packages are still used.

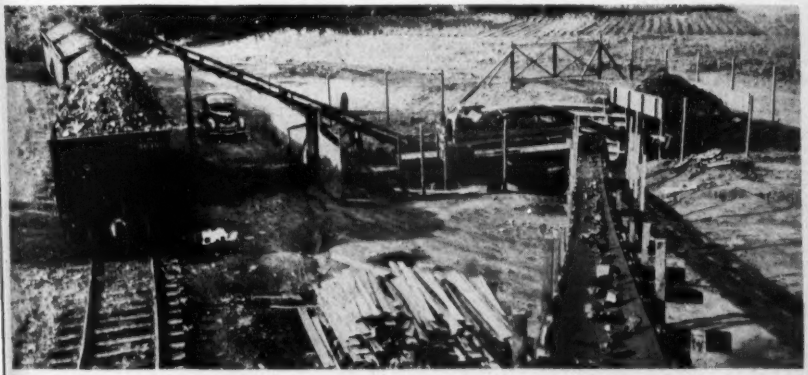
Careful selection of wool top is necessary. Only longer combing wools—64s and finer grades—are used. Minimum staple length is 2½ in. with low short-length content. Finest yarns are from 3-in. wool which needs less twist for equal strength. Absence of short lengths eliminates "bunching" during drafting and gives better control through all operations.

Drawing frames are of primary importance. There, extra-long fibers are broken and slivers doubled to produce more even, loftier yarn. Sliver is conditioned in the breaker drawing frame by a continuous-drip system. Emulsion includes Syton colloidal silica which softens wool for later processes, creates inter-fiber drag, and helps eliminate static electricity from the wool.—Textile World, O, 130

Compounds Resist High Heat

Two new thermal-barrier, sealing compounds—FR-8 and FR-10—developed by American Latex Products Corp. cure by solvent release at about 80° F. The former resists temperatures up to 2000° F.; the latter has resisted 2800° F. for 15 min. and has greater refractive power. Materials will find application as insulating material for junction boxes and heat-exchanger couplings, engine-nacelle sealant, and for lagging hot-air and exhaust ducts.

In tests, an oil tank covered with a ¼-in. layer of FR-10 withstood a 2000° flame for 36 min. without damage to the underlying metal layer.—Aviation Wk, O 4, 24



EFFICIENT PORTABLE SCREEN-LOADING PLANT

Cedar Grove Mining Co. uses this Iowa Mfg. Co. rubber-tired, portable screening and loading plant to handle coal from its 480-ton-per-day truck mine. Production averages 9.6 tons per man-shift with hand loading. Plant is 44x8x14 ft. and weighs 21 tons; it consists of a hopper, reciprocating feeder, elevating belt, mechanically vibrating screen, and elevating and loading belt for undersize. Company believes plant could handle 200 tons per hr. without necessitating modification.—Coal Age, O, 88

Anti-Detonation Injector Designed for Automobiles

Anti-detonation injection, used during the war to give an added power boost to planes, has been designed for use on passenger cars with high compression ratios by Thompson-Toledo Vitometer Corp. Knocking is eliminated; performance on hills is improved greatly. System has the effect of raising regular gasoline 10-20 octane numbers, giving full power without knocking. It can add 25% on a ton-mile basis.

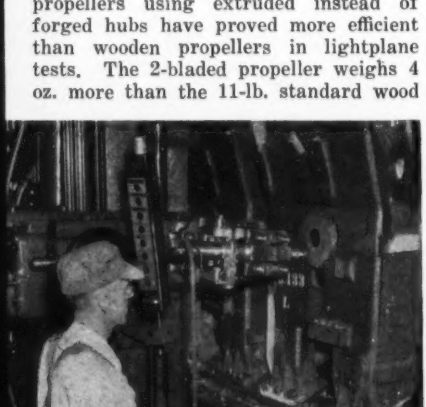
Essentially an auxiliary carburetor, the Vitameter injects the anti-detonant fluid—Vitol—into gas line when accelerator is pressed down suddenly. Vitol is a mixture of 85% alcohol, 15% water, 3 cc. of tetraethyl lead, and a soluble oil. Flow is automatically controlled by manifold vacuum, which is relieved when accelerator is pressed quickly.—Bus Trans, O, 171

Extruded Metal Propeller

Low-cost, fixed-pitch, aluminum-alloy propellers using extruded instead of forged hubs have proved more efficient than wooden propellers in lightplane tests. The 2-bladed propeller weighs 4 oz. more than the 11-lb. standard wood propeller used on Ercoupes; 3-bladed propeller weighs 13½ lb.

In tests conducted on the same Ercoupe, powered by a Continental C-75 engine, the 2-bladed metal propeller gave 8% increase in climb over wooden propeller and developed 2 mph. more speed.

Leading edge of blade is backboned for stiffness, leading edge being milled toward the tip. Hub extrusion is cut to length, then center hole is bored. The 3-bladed propeller is made from the same extrusion and tips are cut off.—Aviation Wk, O 18, 21



Mission Makes Progress

Joint Brazil-U.S. commission, established to report on Brazil's resources and capacity for economic development, is reported to be making some progress. U. S. delegates are headed by John Abbink, chairman of McGraw-Hill International Corp.

Prospects are now good for a commercial treaty that would guarantee fair treatment for U. S. capital in Brazil. Detailed work has moved fast on Brazil's internal credit problem, plans being well along for a central bank. There has been work, too, on agricultural development and transportation.

Other subjects being studied include industrial developments, electrification, mineral development, coal and petroleum, fisheries, tourist trade, and production of war materials.—Business Wk, O 2, 108

JUMP-CUT TOOL SAVES TIME

Obstructed cuts at various heights on workpiece can be made on planers by using a jump-cut tool that also saves setup and machining time. Developed at Naval Gun Factory, it consists of air-operated tool bar fastened to planer head and an operating valve bracketed to bed. Valve is operated by table cam to cause head to advance or retract in 1/20 sec. There is no danger of striking tool against obstruction, even if pads of unequal height are spaced as closely as ⅝ in. and height difference is 2½ in.—Am Mach, O 7, 96

Sonic Navigation Marks Harbor Traffic Lanes

Conventional harbor navigation requires following of floating buoys to keep ships in proper traffic lanes. Fog is a menace. But the Hysonav system is independent of weather conditions.

The system consists of one or more pairs of underwater sound generators located at spaced intervals along a channel or lane. One of each pair is on each side of the lane. Generators are pulsed at intervals, and the pulse from each one has a distinguishing frequency characteristic.

A person on a vessel sailing between the pair can hear both generators with a simple listening or hydrophone arrangement. The listener then navigates the path on which he receives a single note, indicating that signals are being received simultaneously. Generators are pulsed to cause this path to be straight or curved as required by the channel.

If the navigator is not on course, he will hear first one and then the other pulse. As he can tell them apart by the difference in audible pitch, he knows which way to turn to regain his course.—Electronics, N, 92

Fast, Cheap Field Surveys

Field tests show topographic surveys made by portable altimeters offer a practical way to convert aerial photos to contour maps. Accuracy is good; method is faster and cheaper than transit-stadia and plane-table surveys.

Altimeter consists of a hollow corrugated-metal box, spring-lever chain actuating a shaft-mounted pointer, and a circular scale graduated in feet. Altimeters are manufactured by Wallace & Tiernan, Inc., and American Paulin System.

Ground elevations may be gotten with surveying altimeters by single-instrument observations, single-base, and double-base methods.—Eng News-Rec, S 30, 75

Affect Overcurrent Devices

Ambient temperatures have been determined by Underwriters Laboratories to affect performance of overcurrent protection devices. Tests showed that at 30° F. the effecting ampere rating of a 15-amp. circuit breaker, plug, or cartridge fuse increases 12–50% above normal rating.

At 0° F. there is a corresponding increase of 5–35%, depending on type of device, whereas at 100° F. the effective rating decreases to about 90–97% of normal rating. These findings should be considered for service conditions involving extremely cold weather.—Elec C&M, O, 204

SIMPLIFIES MOLD DUMPING

Crane Co. brass foundry closes molds on 4-wheel trucks then pushed to pouring. After cooling period, trucks are moved to end of track where they drop down incline and are stopped by bumpers. Abrupt stop causes mold to slide off truck onto conveyor that carries sand and castings to shakeout. Mold tracks are double-decked, top for loaded trucks and lower for empties returning to molding station.—Foundry, O, 140

SPEEDS BATTERY CHARGING

Continuous operation of batter-operated industrial trucks at Reynolds Alloy Co. required accelerated recharging if only two sets of batteries were to do for three shifts. Charging racks were built in form of long concrete pits with water sprays installed under each charging position. Cooling allows faster charging and prolongs battery life.—Chem Eng, S, 125

Serving Divided Heat Load

Heating two buildings with different heat requirements from one plant introduces the problem of balancing the load. This was encountered in heating a hotel and its annex, the first being transient and the latter residential.

First step in the modernization was to provide a separate steam supply and return for each building, in place of the former common steam header. Automatic valves were then placed in each line and operated at set intervals by simple electric timers.

Final step was to install for each valve a simple outside bulb, in connection with a cycle control having 72-min. cycles; this served to actuate the valve according to outside temperature.—Oper Eng, O, 28

Steel-Industry Trend Still from Oil to Coal

At the 1948 annual meeting of the Assn. of Iron and Steel Engineers, A. J. Fisher of Bethlehem Steel Co. pointed out that the postwar trend is still from use of oil to use of coal or coal products.

Blast-furnace gas is being employed to underfire coke-oven batteries and soaking pits. Coke-oven gas is then burned in openhearth furnaces up to 50% replacement, and boilers are fired with powdered coal or coke breeze to replace blast-furnace gas.

If fuel oil will have to be replaced entirely, next step will be to increase use of coke-oven gas in the openhearth, supplemented by manufactured gas plus firing of tar or pitch for luminosity. The manufactured gas could also be employed in heating and treating operations.—Iron Age, O 7, 102

Titanium—Industrial Metal

E. I. duPont de Nemours & Co., Inc., has started commercial production of ductile titanium, a long known metal that has never been used as a pure metal (See McG-H Digest, Nov., p. 35). DuPont has been using titanium in an oxide form in paints, enamels, linoleum, and paper.

Found in many iron-ore deposits, the metal is more abundant than lead, tin, zinc, antimony, copper, nickel, gold, and silver combined. Many iron-ore deposits, previously abandoned because of the presence of titanium, now are being worked for the titanium content.

Of low-density, the silver-white metal has good strength-weight ratio and corrosion resistance. It withstands salt water and chemicals well. Unalloyed—the only way in which the metal is now produced— it compares in strength with 18% chromium-8% nickel stainless steel. Price per ingot lb. now is $5, but costs will drop as production rises.—Business Wk, S 25, 76

Survey Reveals Power Trends

Principal design trends both in central-station and in industrial installations are presented here as a guide to your design problems

SURVEY of over 700 new steam and hydroelectric stations reveals striking trends in plant design—layout simplification for lower first cost, heat-balance ingenuity for high economy, and sound equipment selection for reliability and low maintenance.

Trends in the steam central-station field are significant. About two-thirds of reported units use steam pressures of 800 psig. and above, and temperatures of 900° F. and above. Most boilers are equipped with economizer or air heater, or both.

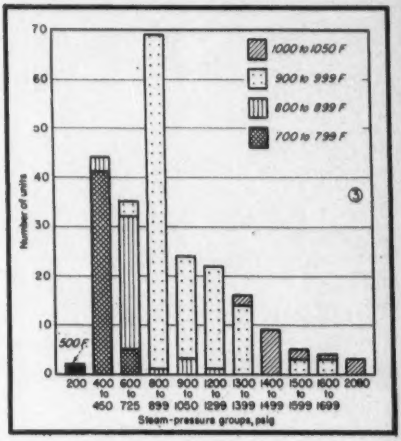
Pulverized coal is the most popular fuel. Use of one boiler per turbine predominates, and utilization of four or more bleed points continues. In 233 plants surveyed, only eight were topping.

A definite attempt to increase over-all economy appears in the 12 reheat installations reported. Most have initial and reheat temperatures of 1000-1050° F., reheat being applied for its better heat rate rather than for moisture control.

Of 167 turbines 20,000 kw. and larger, only three are air-cooled, the others using hydrogen. Vast majority of installations have electrically driven auxiliaries, only 16 having turbine-driven pumps exclusively. For speed control on fans and pumps, 80 hydraulic couplings and 25 magnetic couplings were reported.

The survey included 250 steam-power plants of 100 psi. and above serving industrial establishments and institutions, as in the pulp and paper, chemical, steel, and food industries. In this field, small sizes and low pressures predominate. By far, the majority of installations are below 299 psi., these units being installed primarily for process and heating loads.

Data on firing methods show a trend away from oil firing toward stoker firing, with pulverized-coal firing becoming more important in higher pressure ranges. Also, there is a trend to increasing use of dust collectors, presumably to reduce air pollution.

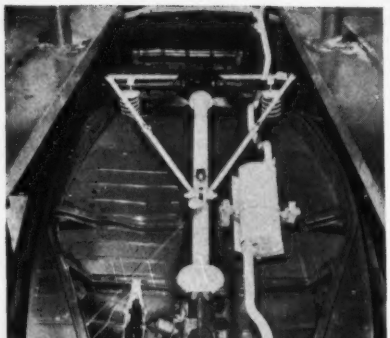


CENTRAL STATIONS, according to survey, are most frequently applying steam pressures in the 800- to 899-psig. range and temperatures from 900° to 999° F.

There is evidence too that designers are building into steam-generating units the larger furnaces essential to operating flexibility where a wide range of coal characteristics must be handled.

New hydroelectric-plant construction continues at an accelerated rate. Grand Coulee plant is still the world's largest power plant, with a present capacity of 1,513,000 hp. and an ultimate capacity of 3,012,000 hp.

Water power in Canada is being developed rapidly. Now under construction is capacity of 2,750,000 hp. About 97.5% of present Canadian central-station power is hydro generated.—Power, O, 71



UNDER BODY is extremely clean since . . .

Nash Uses Built-in Frame

The 1949 Nash car has eliminated the standard chassis and adopted a built-in frame—body and frame are a single structure. Front-end extensions from the body proper are eliminated; front-end suspension support is improved.

The battery has been moved up under the hood, and coil springs also have been adopted.

All wheels will be completely enclosed in the body, but turning radius has been decreased. Lower sides of the body curve in slightly to keep panels away from curbs. Cross-section is quite oval. All instruments have been mounted in a single unit atop the steering column, viewed through the steering wheel. Removable side panels on unit simplify maintenance.

Bumper jacks must be used to change tires, standard jacks will not raise body high enough to permit removal of tire.—Science Ill, N, 34; Am Auto, N, 26

New Packaging Materials

Many new packaging materials were discussed at the Western Packaging Exposition and Conference held recently in San Francisco. Among new materials that caused interest were:

Polyethylene—known as Visqueen, Polythene, or Reynolon 1000—used for packaging small arms during the war, is produced as film by extrusion and casting. The former method is the cheaper. With a specific gravity of 0.92, yield in sq. in. per lb. is high.

Still in experimental stages are lightweight films made from styrene with characteristics similar to those of polyethylenes. Called S-Polymers 50 and 60, the film has low moisture, oxygen, carbon dioxide, and nitrogen transmission rates. They are stable in sunlight, inert to weak acid and to weak or strong alkalies.

A modification of Saran Film Type M, Saran 517 is a suitable wrapper for frozen foods, cheese, butter, dehydrated products, fresh fruits and vegetables, metal parts, and petroleum products.

Cry-O-Vac, so far used only as a frozen poultry packaging material, is a modified vinylidene film. It has low moisture-transmission rate, toughness, flexibility, and the ability to assume the shape of the product wrapped.

A new coated paper, called Anti-Myotic, is a lacquer-coated glassine with a mold-resistant agent added. It retards mold growth on product and will be valuable especially for foods subject to spoilage.—Mod Packaging, S, 145

Money for Middle East Oil

About $2-billion will be invested in Middle East oil in the next 5 years if Arab-Israeli differences and the steel shortage do not interfere. The investment will be for production, refining, and pipeline facilities. At present, Middle East production is at 1.1-million bbl. per day; by 1956 it should reach 2-million bbl. per day.—Business Wk, S 25, 117

Continuous Acid Treating Heavy Lubricating Oil

Sinclair Refining Co., at its Coffeyville, Kansas, plant, employs a continuous acid treatment of lubricating oil. It results in 20% less acid consumption and 25% less sludge loss than would prevail under batch treating. Other advantages include cleaner acid oil, less oil in sludge, and more constant quality of sludge.

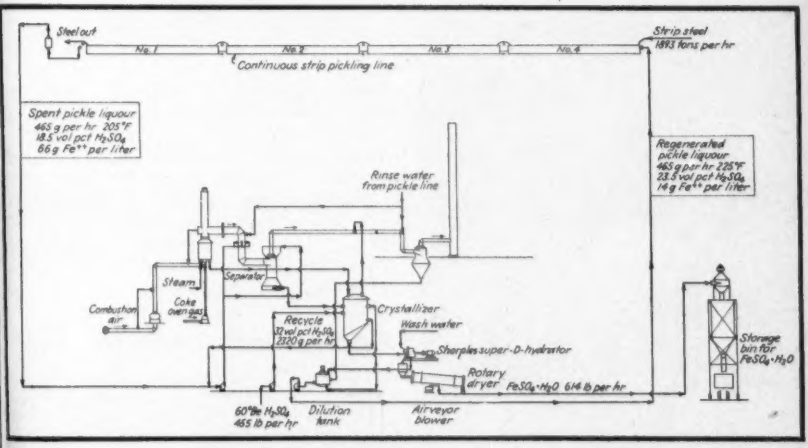
Raw stocks are blended by air blowing and kept at 150° F. in storage tank. The oil passes through a water-oil exchanger for precooling, then to the acid mixer.

At the same time, 98% sulphuric acid is pumped into the oil stream just before it enters the mixer. In the mixer, a 12-in. pipe 68 ft. long, the oil and acid are blended thoroughly by mixing paddles.

The acid-treated oil leaving mixer contains sludge in a highly disseminated condition. Coalescence of this sludge is produced by injecting water into the stream and mixing by passage through orifice plates located just ahead of two settling tanks. Final sludge-free oil is neutralized and bleached by contact treatment at 550° F. with fuller's earth. —Oil & Gas J, O 14, 87

Drug for Sleeping Sickness

Early results of tests in Central Africa of M.7775, a new drug developed by Imperial Chemical Industries, seem to establish its effectiveness against sleeping sickness in cattle. Tests will continue for several months. Immunity is expected to last at least 6 months. If successful, the drug can result in opening up vast fertile areas in Central Africa (at present plagued by the tsetse fly) into a huge beef-producing region.—Chem Eng, O, 230



REGENERATIVE SYSTEM FOR PICKLE LIQUOR

Inland Steel Co. acid regeneration system for continuous strip pickling line pumps pickling solution through surge tank to evaporator, combines it with recycle liquor from crystallizer, and sprays mixture into stream of hot combustion gases. Concentrated liquor is removed from gases by separator, drains to crystallizer, and is heated. Fresh acid is added, and ferrous sulphate monohydrate crystallizes out. Filtrate is diluted and pumped back to pickling lines for reuse.—Iron Age, S 30, 60

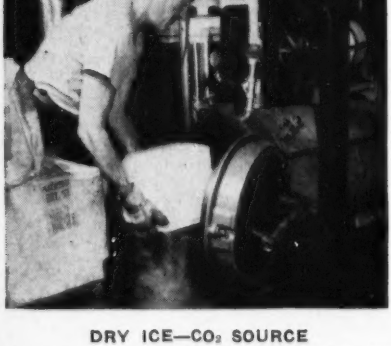
European Lighting Progress Viewed As Encouraging

Europe, despite shortages in power, equipment, and materials, is making progress in developing and adapting modern lighting methods. England seems to be the most reserved in its lighting applications, approaching each problem from a completely functional viewpoint. In France, design and emotional approach take the lead, while in Holland the lighting engineers follow an intermediate course, designing on a brightness engineering basis.

In England, commercial lighting installations are far advanced over the residential, but even here there is no abundance of fluorescent lamps. The most conscientious work is being done in the industrial field, and it is here that most fluorescents are used.

Design and beauty lead in France. Combinations of metals are employed in well-proportioned multi-armed ceiling fixtures, while tall table lamps use pottery of modern design. Louver designs depart from egg-crate patterns and are extremely effective. But lighting results produced could perhaps be improved upon were quantity and quality considered more thoroughly.

Engineers in Holland are experimenting with new fluorescent light sources. Illumination-level standards have been set up for various eye tasks and conditions. Holland practice closely approaches the U. S.—Elec West, S, 85



DRY ICE—CO_2 SOURCE

Carbonation of beverages is economical with dry ice, as its use eliminates handling of cylinders. Units have been developed to convert dry ice at bottling plants. After dry ice is charged into converter, it becomes a high-pressure cylinder containing liquid CO_2. Liquefaction can be speeded up by spraying water over the surface of the converter.—Food Ind, O, 110

Radiodyes Locate Tumors

Diagnosis and localization of brain tumors are aided by radioiodine incorporated with diiodofluorescein and injected into the patient intravenously. The dye tends to localize in tumor tissue in a concentration as high as 17 times that in normal brain tissue.

Limitations of the method are determined by (1) size of tumor, (2) depth of tumor within brain, and (3) concentration ratio of radiodye in tumor to that in surrounding tissue.

Conclusions drawn from tests are that tumor volume of 20-40 cc. can be detected by Geiger counter if concentration ratio is at least two, and that smaller tumors can be localized with greater concentration ratios. Maintaining the counter normal to the skull appears to be the best procedure.—Nucleonics, O, 62

North Atlantic Weather Ships

By June 1949 all airlines flying North Atlantic routes will draw weather information from 13 weather ships spotted in the area. Eight are in operation now. The weather ships are part of the International Civil Aviation Organization program. Ships will be manned by U. S., French, Belgium, Dutch, Canadian, and United Kingdom crews.—Aviation Wk, O 11, 42

VENTURI arrangement of central gas jets and peripheral water jets shows how . . .

Venturi Scrubber Solves Openhearth Fume Control

Steel mills, confronted with a fume problem, can solve it by use of a new scrubbing device for cleaning stack gases. Results of full-scale installations of the unit, called the Pease-Anthony venturi scrubber, indicate 95-99% efficiency in iron-oxide fume removal.

The venturi method consists of injecting low-velocity water into a high-velocity stream of dirty gas. The gas impinges on and disrupts the large jets of water and accelerates the drop so that much of the water is atomized. Gas and spray mixture is decelerated and separated in an eliminator, the liquid then containing most of the solids.

The scrubber is presently applied only when oxygen is being injected into the openhearth bath. It has seven central spray jets for gas, while water jets enter around the periphery of the venturi throat. Tests are now underway on its use in connection with electric arc and blast furnaces.—Iron Age, S 9, 78

General Motors Bus Seats 55

Believed to be the largest unarticulated bus ever built, General Motors Corp. has announced a bus seating 55 passengers with unobstructed standee area. Designed as a replacement for obsolete trolley lines, the bus will soon be in operation in New York City and Chicago.

Engine is a 200-hp. diesel, coupled to a hydraulic drive transmission. A 45-in. front door and standard rear door guarantee quick passenger circulation. Body is aluminum. Undercarriage is reinforced at points carrying load of large standee crowds.—Bus Trans, O, 71

Develops New Transducer

U. S. National Bureau of Standards is developing a highly sensitive mechano-electrical transducer which transforms slight displacements into large changes of resistance, current, or voltage.

Active element is a helical or conical spring, wound so the initial tension varies slightly along its length. Thus, when ends are pulled apart, the turns separate one by one rather than simultaneously.

Resistance can be varied over a wide range by stretching the spring. Displacements of 0.00001 in. can be measured easily without use of electrical amplifying devices. Possible applications include automatic temperature controls, dc-ac. inverters, voltage regulators, strain gages, pressure elements, accelerometers, and electrical weighing devices. —Elec World, O 9, 122

Raises Plane Fueling Rate

Single-point refueling systems will be adopted on all Air Force planes to permit faster ground refueling. The system, developed by the Air Materiel Command, permits filling all tanks from one point or all filler points simultaneously. A B-36 will be refueled by a crew of two with 20,000 gal. in 1 hr.

Float-operated shut-off valves in each tank also permit automatic transfer of fuel in flight as plane balance changes. During refueling, valves shut off when tank is filled, shunting fuel to the adjacent tank.—Aviation Wk, O 11, 30

BUILDING BLOCKS and these . . .

. . . PLASTIC PICTURES show . . .

Plastics Becoming Important

War speeded development and application, but more progress is needed. From 7,000 items exhibited, thirty selected as the most practical applications

PLASTICS and plastic products developed since the war were displayed and judged at the seventh annual *Modern Plastics* competition held recently in New York City. Impact of war-time development on the industry was great. Design and engineering, material formulation, product presentation for consumer market were equally as great. Yet industry men see much to be done.

Applications of plastics must be refined; product size should be further enlarged; product presentation, promotion, and merchandising and labeling for consumer approval must be strengthened.

From viewing the 7,000 plus items exhibited it was evident that plastics have replaced to some extent materials previously used to make such objects as flashlights, small radio cabinets, toilet seats, shower curtains, rain apparel, furniture covering, and electrical appliances.

Today over 40% of the children's toys produced are plastic. Ethyl cellulose, cellulose acetate, butyrate, and the propionate formulations are used where impact resistance is needed. Polystyrene and acetate are also widely applied. Multi-cavity production on heavy-shot injection machines is general.

Vinyls now are being used instead of rubber for garden hose. In furniture and interior decorating, vinyls are in wide use as flooring and as furniture and wall coverings. Polystyrene wall tile, high- and low-pressure decorative laminates, and acoustical materials of vinyl and polyester resins are in wide use.

Use of low-pressure plastics is not great. One interesting example of their use was in a glass mat polyester boat. Many reasons for minor applications of low-pressure plastics are given: insufficient standardization of techniques, high

cost, lack of knowledge of the plastic itself.

For signs and displays, wide use is made of acrylics—drawn acetate and rigid vinyl predominating. Plastics appear to be becoming the standard material for such use; large size cast sheets of acrylic will make possible larger displays, and may be applied to the field of architecture.

Thermosetting materials still are most widely employed in industrial applications of plastics, but there is a trend toward use of other materials, including polystyrene, polytetrafluorethylene, and silicones. Higher-speed machines, necessity for lower maintenance costs, and extreme specialization of machine design have given added importance to laminates and molded phenolics.

Thirty awards of application were made by *Modern Plastics* at the recent plastics exhibition. Of special interest were:

Columbia Protelstosite Co., Inc's, molded polystyrene partition blocks (see cut). Blocks weigh one-fifth as much as glass blocks. Installation is simplified by molded interlocking grips; adhesives and clamps are not necessary. Blocks are made of three separate moldings—two faces and a center structure. Faces are faceted for light diffusion. The blocks will carry only their own weight.

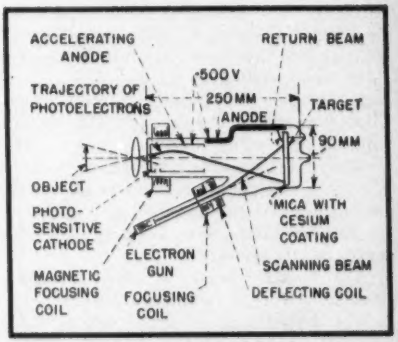
Roto Beam's air circulator. Using Durez high-impact phenolic for propeller blades instead of aluminum, weight is cut 50%, manufacturing costs reduced 50%, and same performance is obtained from a smaller motor.

Electric Storage Battery Co.'s plastic storage battery. Designed to produce 15 hp. for 3 min., the 24-volt battery is for jet planes. Because of its acid and electrical resistance, ability to resist distortion, and its specific gravity, polystyrene was used. The battery offers more starting power for less space and weight than any other non-spill, lead-acid battery.

Lightolier, Inc.'s, Decoralite (see cut). Ability of acrylics to "pipe" light produces these attractive pictures (See McG-H Digest, Oct., p. 38). Rear face of sheet is abraded and engraved, then painted. Lumiline fluorescents, one above and one below, produce a 3-dimensional effect. They produce no glare.—Mod Plastics, S, 109

Unloads Plane in Flight

Developed by Air Materiel Command, a cargo-dropping system will unload 16,500 lb. of cargo in 5 sec. from a Fairchild C-82A in flight. Overhead monorail carries 15 bundles, each weighing 300 lb., forward to a 36 x 72-in. hatch in fuselage floor. A floor conveyor system of three endless belts moves 12,000 lb. to a rear cargo hatch. System can be installed by two men in 30 min.—Aviation Wk, O. 4, 25



ERISCOPE CAMERA TUBE

The eriscope, a French television camera tube, gives high resolution and sensitivity. It separates forming and scanning functions. The optical image is formed on inside surface of transparent photosensitive cathode, and so emits electrons which are accelerated by an anode at 500 v. above photocathode and focused by a magnetic coil. The optical image is thus converted to an electrical image focused on the scanning target made of cesium-coated mica. The target is then scanned by electron beam from an electron gun. Deflected electrons are picked up by anode on tube surface, producing the output signal.—Electronics, O, 130

Instruments Guide Industry; Now 10% of Capital Outlay

A few years ago industry paid little attention to instrument purchases in processing plants. Now such purchases total 10% of all capital expenditures. Two trends have boosted the use of instruments: transfer of sensitive processing methods, needing close control, from the laboratory to the plant and adoption of continuous processing in place of batch processing. Application of instruments is almost unlimited as to industry.

Among new process-control instruments shown at the recent American Fair & National Instrument Conference was a robot prophet called an "analog" that will duplicate in advance an entire complex process in a plant.

The analog gives management the total operating story including possible disturbing factors before plant production is started. Composed of electrical, pneumatic, and hydraulic units, the analog plots the processing information as performance curves. Such machines predicted performance at the Oak Ridge atomic processing plant.

Other instruments shown included:

(1) Simplified designs to make instruments easier to install, use, and maintain.

(2) Applications of electronic devices such as transistors.

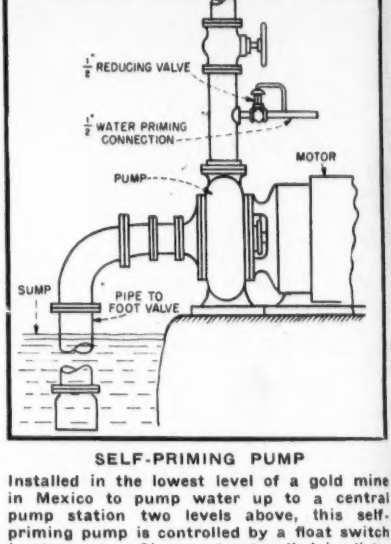
(3) Wider use of synthetic crystals and sonic forces for measurement.

(4) Experimental work with new developments such as the magnetic clutch (See McG-H Digest, June, p. 13).—Business Wk, S 25, 68

Takes Pictures 10 Miles Up

Nearly 4 ft. long and 15 in. in dia., a new telephoto lens has been developed to take aerial photographs from altitudes up to 10 mi. It will be used with the Air Force's K-34 camera. Focal length is 60 in.; speed is f/60.

A thermostatically-controlled electrical heating unit maintains proper focus at low temperatures. Adjustments can be made for variations in atmospheric pressure. Lens elements are coated with magnesium fluoride to increase light transmission and to reduce flare.—Aviation Wk, O 11, 30



SELF-PRIMING PUMP

Installed in the lowest level of a gold mine in Mexico to pump water up to a central pump station two levels above, this self-priming pump is controlled by a float switch in the sump. Since water handled is dirty, slime kept foot valve from seating properly, and permitted leakage through valve. Now fresh water, entering at the rate of 1½ gph. replaces water lost through the foot valve during shutdown.—Coal Age, S, 122

Prevents Mold on Citrus

Recently patented wrapper prevents mold during shipping and preserves quality of citrus fruits (also see New Packaging Materials, p. 28). It is made of tissue paper impregnated with a mixture of wax, mineral oil, and pine oil, or alpha terpineol. Impregnating material is non-toxic, and is selective and specific to types of mold infesting citrus fruits. —Food Ind, O, 187

TVA Improves Phosphorus Combustion System

Tennessee Valley Authority has installed a new combustion chamber in its phosphoric-acid plant. The chamber, 16 ft. in dia. by 34 ft., has graphite block rings joined together with cement.

Choice of graphite was based on its excellent thermal properties and its resistance to hot oxidizing atmospheres containing P_2O_5 vapors. As graphite will oxidize above 800° F., walls are cooled by water flowing down from spray rings encircling the tower. Surface temperature of inner wall was thus kept below 300° F.—Chem Eng, O, 105

New Industrial Diseases

Industrial use of new chemicals and radioactive isotopes has focused attention on three new industrial diseases. Papers covering the diseases were given before the annual meeting of the American Bar Association.

Recent studies show the incidence of lung cancer among chromate workers in the U. S. to be 18–50 times normal. Long exposure to dust or fumes in chrome-ore reduction is the prime cause; length of exposure may be from a few to 40 years.

Beryllium poisoning is contracted after exposure to beryllium compound dust—in beryl mines, extraction plants, steel and nonferrous foundries using beryllium alloys, and in plants producing phosphorus, fluorescent lamps, or radio tubes.

Radioactive diseases are becoming more common, although they are not strictly new. Increased use of radioactive isotopes in industry and medicine is blamed. The disease may not appear for months or years after exposure.—Business Wk, S 25, 66

Anneals Bimetal Strip

Process annealing of thermostatic bimetals must, for quantity production, be based on three requisites: bright finish, uniform anneal, and mechanical handling. W. M. Chace Co. meets all three by use of a Sunbeam Stewart twin-belt electric furnace.

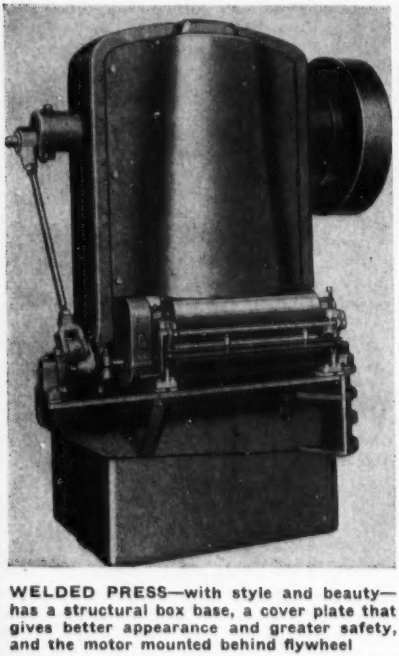
Work is fed, in strip form, between the two belts. Their pressure is sufficient to restrain the normal deflection of the bimetal during heating and cooling cycles. Total furnace length is 48 ft., including the extension at the loading end.

Belts are made of woven wire—35% nickel, 15% chromium, balance iron. Furnace atmosphere is cracked ammonia gas. Production is now running 200–240 lb. per hr. at an operating cost of 2¢ per lb. as compared with 12¢ for the previously used salt-bath batch process. —Am Mach, S 23, 108

HELPS LIFT CONVEYOR

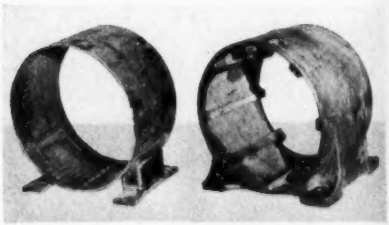
Counterweight at the hinged end of a section of roller conveyor at Cosmetics Laboratories makes lifting a section easy. Crawling under, hopping over, or lifting of heavy sections is eliminated. A "catcher" arrangement on a spring release holds cases while section is displaced.—Factory, O, 126

Hints in Good Welding Design



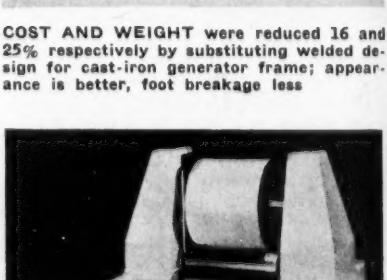
WELDED PRESS—with style and beauty—has a structural box base, a cover plate that gives better appearance and greater safety, and the motor mounted behind flywheel

SPOT WELDING of left resistor mounting hook saves 40% over arc-welded hook and eliminates post-weld cleaning



COST AND WEIGHT were reduced 16 and 25% respectively by substituting welded design for cast-iron generator frame; appearance is better, foot breakage less

FUNCTIONAL DESIGN has produced a welded roller that can operate close to high obstruction and in close quarters



WELDED cloth rewinder gives higher efficiency, reduces hazards, needs less space than old-style rewinder

Planning for Welded Design

Incorporating welding in designs may mean stronger, lighter, more attractive, less costly products, as shown by a variety of designs on the opposite page

AN ANALYSIS of all the factors affecting a new design will determine the most advantageous materials for use on the product concerned and ascertain whether the metal parts should be formed from rolled or extruded shapes, castings, or forgings. Then follows the question of joining the metals.

Welded design is often the proper answer. It offers high efficiency of joints and rigidity of structure. But it is the duty of the designer to select his design while keenly aware of the function of the product.

One great error encountered in design of welded products is that too many designers are prone to make the new design look like the object it is replacing. A weldment should not necessarily look like a casting or a forging. When it does, the designer may have failed to take full advantage of the engineering freedom made possible by welding.

Once a welded design has been selected, certain other decisions must be made. One is the welding process to be used. It will naturally depend to a large extent on equipment available. The type of service of the finished product also must be considered, as it may limit the welding to one method.

Choosing the Weld Joint

The next step for the designer is to choose the type of weld joint. He must here consider characteristics of the different type joints. For instance, a properly made butt weld will have a static-load value of 100% and a fatigue-load value of 100%, whereas a 100% penetration fillet weld will have a 100% static-load value but only a 40% fatigue-load value. Furthermore, weld-joint design involves determination of the proper amount of weld metal to be deposited.

The designer next must decide the type of scarf to be used on the joint. Merely flanging the sheets may do for thin materials, whereas plate thicknesses require beveling for V and double-V joints. On even thicker material, a J-type scarf may be desirable if machining cost does not outweigh savings in weld metal.

Incorporation of castings and forgings in the weldment may present the least expensive design, especially where there must be abrupt change in section as at bearing bosses. Also, the designer may be able to eliminate many corner welds by use of stamped, pressed, or formed parts in the design. Their use, however, may depend on equipment availability.

Selecting the Material

Selection of material for weldments gives flexibility to the designer. Practically any metal can be welded with proper technique and process, although low-carbon steel, such as SAE 1010 or 1020, is the most commonly employed.

Product requirements may govern selection, such as a stainless material in food-processing equipment. Weight too may be an important consideration, in which case the designer may select a low-alloy, high-strength steel. He must then check carefully to be sure that proper balance is maintained by adequate distribution of materials. This care will insure a smooth flow of stresses. It may also be necessary to reinforce lighter sections with ribs or gussets near lightening holes.

In nearly every design, cost is the most important factor. Possible savings include material and time, and there are no pattern and pattern-change charges. The kind of welding too may be a factor in reducing production costs and speeding up production.—Weld Eng, O, 33

TECHNICAL SHORTS

Automatic Mine Door—Model of a new type automatic mine door was shown at the Southern Appalachian Industrial Exhibit. Locomotive or mine car side pushes a pivoted horizontal bar as it nears door. Bar acts as a hinged lever to open door. Cars approaching door from opposite side open the door by direct contact with the door.—Coal Age, O, 120

Auto Retooling Costs—New Hudson convertible brougham shows how tooling costs are up. Tooling for this one car exceeded complete tooling costs for entire prewar line of Hudson cars. Engineering and tooling cost more than $1-million.—Iron Age, S 16, 100

Don't Edge Safety Glasses—Case-hardened safety glasses must never be edged to fit them into a frame. Edging destroys case-hardening and frame-pressure on edge of lens may crack them.—Optical J-Review, S 15, 47

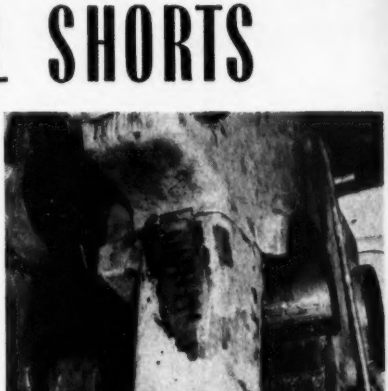
Dutch Car Tilt—To simplify repair work under cars, Jan J. Neuteboom, Holland, has designed a tilt to tip automobiles. Car is driven onto runways running between two laminated metal hoops and clamped in place. Hoops are rotated by crank. A 3-hoop unit handling heavier cars is powered by a 1-hp. motor.—Business Wk, Ag 21, 30

Stops Germ Growth—Antiseptic coatings can be applied to aluminum, magnesium, zinc, and tin and retain potency for years. Patented process, which arrests bacterial and fungal growths, is based on immersion in 8-hydroxyquinoline.—Prod Eng, O, 7

Armored for Long Life—Hard facing is claimed to increase life of parts subjected to severe service. A Pittsburgh steel plant increased life of guides for 15-in. rolling mill from average of 600 billets for chilled iron to 150,000 billets by hard surfacing with martensitic cast iron.—Steel, O 11, 96

Suppresses Corona—Ceramic bushings and other insulators subjected to high potential gradients can be given semiconducting coating to suppress corona at high altitude. Method is effective on radar and airborne electronic equipment.—Electronics, O, 204

Twin-Quad Skids—Stainless-steel skids projecting 3 in. below belly of the Beech Aircraft Co.'s *Twin-Quad* and running along both fuselage edges permit safe belly landings. In tests, plane stopped after 615 ft. There was no buckling of bottom or sides. Landing slide was fully controlled except for initial swerve.—Aviation Wk, Ag 30, 12



REPAIRS CRACKED PRESS COLUMN

Worcester Pressed Steel Co. repaired a diagonal crack in column of 340-ton toggle press by Metalock. Lines of holes were templetdrilled across the crack, and metal between holes was broached out to leave scallop-edged slots. Scalloped locking strips (Metalocks) were driven into slots, and surfaces ground smooth ready for paint. Repair cost was $200, downtime only 3 days.—Am Mach, Ag 26, 73

Longest Diecasting Die—Believed to be longest diecasting die ever made, an 80-in. die of special alloy steel was recently put to work producing zinc-alloy automobile fender moldings nearly 66 in. long and weighing 2¾ lb. Die is expected to cast 1- to 3-million pieces.—Foundry, O, 122

Alloying White Cast Iron—White cast iron can be changed from the usual pearlite to hard martensite by alloying. The alloy has a Brinell hardness range of 550-725 and 25-50% greater strength and impact resistance.—Eng & Min J, O, 86

Welds Tiny Razor Blade—Ward Machine Co. welds a ⅛-in. wide blade for dry-shave razor. The blade is made by spot-welding a strip of hardened steel to a strip of mild steel in a miniature roll spot welder at 1,440 spots per min.—Weld Eng, O, 80

Prevents Manhole Explosions—Boston Edison Co. is installing new manhole covers to free manholes of combustible gases. Covers are slotted to provide 40% open area, compared with former five 1-in. venting holes. Weight is 25% less.—Elec World, O 9, 112

Basementless 2-story Houses No Saving—Elimination of the basement in 2-story houses and substitution of equal space above ground is uneconomical, according to Housing & Home Financing Agency. For 1-story houses, such a substitution represents a saving. Additional cost in the 2-story house occurs because a full basement represents a smaller percentage of the total volume of the house than in a 1-story structure.—Eng News-Rec, S 30, 65

Loading Truck Bodies—Vernor bottling plant in Detroit uses demountable truck bodies. Hoist lifts off a body, carries it inside building where it is unloaded of empty cases and loaded with full cases, and returns it to truck. Bodies are interchangeable on trucks. —Food Ind, O, 120

No Corrosion from Salt Chromate—Tests by Goodrich Tire & Rubber Co. show that a solution of salt and sodium dichromate used for snow and ice removal has no corrosive effect on under-body parts. Chromates seem to arrest corrosion of salt previously trapped. Solution has no adverse effect on natural or synthetic tires, possibly toughening them slightly.—Motor Age, S, 118

Plastic Press Die Guards—Allis-Chalmers Mfg. Co. has adopted plastic guards for use on all punch presses. Guard is fixed directly to the die and they are stored together. Over 10,000 dies will be so protected.—Factory, O, 103

Tests 3-phase Motors—Small plants rarely have instruments for maintenance testing of 3-phase 3-wire motors. But satisfactory results can be obtained by using ordinary polyphase power meter to measure kw.-hr. consumption, kw. demand, hp. in use, power factor, and approximate amp. pulled.—Elec C&M, O, 70

Tonnage Oxygen in Steel Mill—Experimental work at Weirton Steel Co, on use of tonnage oxygen emphasized three points: (1) oxygen in blast furnace will not eliminate stoves for preheating blast; (2) higher scrap can be charged in bessemer when using oxygen; (3) use of oxygen in open hearth is of greater advantage with a high scrap charge. —Steel, O 18, 148

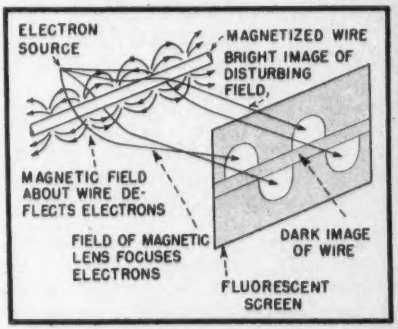
Speeds Sewer Surveys—Checking uncharted openings in sewers is speeded by a new device developed by A. W. Ely. Locating wyes, crosses, and tees in pipes 6-21 in. dia. at the rate of 10 ft. per min., three adjustable springs maintain contact with pipe wall. Unit is pulled upstream from manhole to manhole; when an opening is located, a counter, reading in 0.1-ft., records the location.—Eng News-Rec, O 14, 106

Seven-mile Conveyor—A Hewitt-Robbins-designed conveyor belt will carry 4-million tons of rock 7-mi. to the new Bull Shoals dam. It consists of 21 flights or individual belts, longest single flight being ½ mi. long. Belt travels 7 mph. and delivers 650 tons per hr.—Business Wk, O 16, 24

Stops Mine Conveyors—To prevent severe damage in event of derailment of apron-type conveyor, Hutchinson Coal Co. has placed 20 electrical fingers below carrying run. Clearance is 1 in. If rollers come off or pan is bent, finger actuates safety control, stopping conveyor.—Coal Age, O, 116

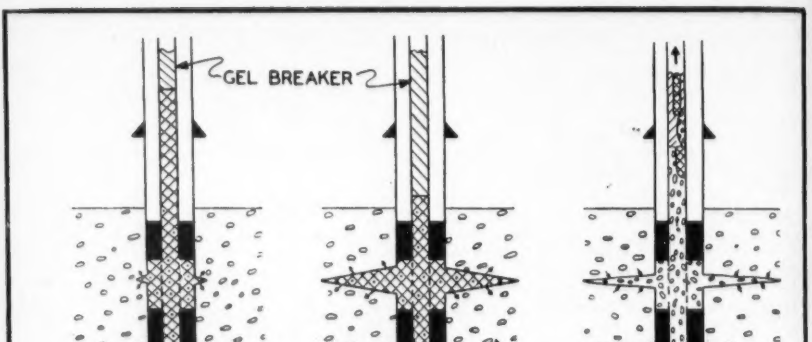
Crystals Measure Radiation—More sensitive and accurate than Geiger counter, crystals are employed to measure nuclear radiation in laboratory work. Fluorescence from radiation is converted by electronic circuit to measurable electric current.—Chem Eng, O, 80

Improves Catalytic Cracking—Houdry Process Corp. has a new low-cost catalytic cracking process called Houdriflow, employing gas-lift for raising the catalyst. Installations are being made by Great Lakes Refining Co., Sun Oil Co., and Tide Water Assoc. Oil Co. —Oil & Gas J, O 14, 133



VIEWING MAGNETIC FIELDS

National Bureau of Standards studies space-charge fields, configurations inside wave guides, fields produced by contact potentials, and metal microstructure by electron microscopy. A disturbing field, such as a magnetized wire, distorts electron trajectories so a dark image of the obstruction and an image of the disturbing field are formed on a fluorescent screen in the conjugated plane. Method is being applied to measurement of wire magnetization of sound recording and for storing data used by electronic computors. —Electronics, O, 128



OIL-WELL TREATMENT consists of (a) pumping jellied gasoline into well, (b) cracking of rock layer by gel, and (c) liquefying of gel by gel breaker so gasoline, chemical, and oil all flow out together, showing how . . .

Hydrafrac Raises Well Output

To meet the need for increasing oil-well production, a process has been developed to increase formation permeability by hydraulic fracturing

HYDRAULIC FRACTURING process, Hydrafrac, shows distinct promise of increasing production rates from oil wells producing from any type of formation. It is also considered applicable to gas and water-injection wells.

Developed by Stanolind Oil & Gas Co., the process consists of two steps. The first step—formation breakdown—is done by pumping into the well a viscous fluid, such as crude oil or gasoline to which a bodying agent has been added.

The high pressure applied to the fluid splits the formation and opens cracks through which oil or gas can flow to the well bore. The viscous fluid also contains a granular material, such as sand, which acts as a propping agent to keep cracks from closing once they have been opened.

The next step is to reduce the viscosity of the fracturing gel by adding a liquid chemical, or gel breaker, such as a 2% solution of petroleum sulphonates in gasoline or crude oil. When the well is placed on production, the treating agents will then flow out.

Experimental application of the Hydrafrac process to 23 wells showed significant and sustained increases in productivity on 11 wells. Six were gas wells; in one instance, a combination Hydrafrac-acid job was done, increasing deliverability from 53,000 to 439,000 cu. ft. per day. The Hydrafrac treatment first raised production to 322,000 cu. ft.; then the acid process increased it again.

The five oil wells treated by Hydrafrac presented even stronger cases for the economic possibilities of the process. In one well, productivity increased from 60 to 160 barrels per day.

Quantity and pressure of viscous fluid needed to fracture the sand vary from district to district. For the Woodbine

sand of East Texas, an average of 1 bbl. of jellied crude per min. at a bottom-hole pressure of 2,900 psi. was required to fracture the sand, and 10.7 bbl. per min. at 2,600 psi. were needed to extend the fracture to a 50-ft. radius. For Booch sand in Oklahoma, volume and pressure were 0.1 bbl. at 2,100 psi. for fracturing and 0.6 bbl. at 1,700 psi. for extending fracture.

The new process promises aid in three ways: (1) rejuvenating old wells; (2) decreasing number of wells needed to drain a field; and (3) bringing into production new fields where rocks are so tight that oil otherwise could not be produced.—Oil & Gas J, O 7, 122; 14, 76

Carbides Continue to Gain Wider Industrial Uses

New techniques and mixtures show that carbides are economically sound for many jobs in addition to tool tips and dies. One such application is for solid carbide rolls for rolling extremely thin steel sheet. Each set includes two of these rolls, backed up by several conventional steel rolls. Results have been excellent.

Another use is for brick-mold liners that can withstand the grinding action of such highly abrasive materials as magnesite, alundum, and corundum. Maintenance is reduced greatly from ordinary practice.

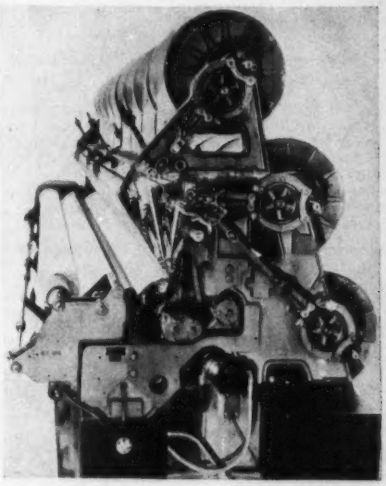
The automotive industry has applied solid carbide bars to precision boring of small, deep holes. Its unusual stiffness permits use of bars 3½ in. long and only 0.32 in. in dia. Boring of valve guides is a typical job. Other automotive applications are (1) solid carbide broaches for machining main bearings and (2) carbide linings for the steel blocks that hold bearings during broaching.

Other general uses include tempering blocks for razor blades, slitters for cutting sheet steel for cans, and double seaming rolls. Solid carbide pieces are being made up to 100–120 lb., or 18 in. O.D. by 8 in. deep.—Steel, S 27, 103

Wrought-Iron Lock Facing

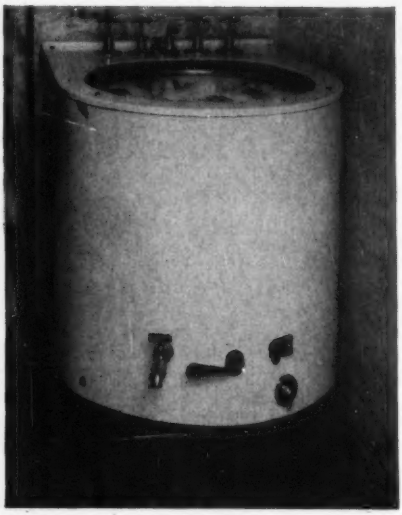
Wrought-iron plates are being used to resurface disintegrating concrete lock chamber walls along the New York State Barge Canal. Concrete facing is blasted away with dynamite. Then the plates, ⅜-in. by 18x36 ft., are placed. Anchoring is by wrought-iron bolts clinch-anchored to the wall and plug-welded to plate. Space between plate and wall is backfilled with concrete.

Plates are received in 6x36-ft. sheets and three are welded together. Top plate is bent on a 2½-in. radius to form coping. Vertical plate joints are spaced to match expansion joints in wall.—Eng News-Rec, S 30, 61



THREE-BAR TRICOT MACHINE

This 3-bar tricot unit produces cloth of novel design in almost unlimited plaids, stripes, checks, and inlays. Normal running speed is 320 course per min. but it can be stepped up to 360 cpm. used as a 2-bar machine. Chain link or pattern wheel drive is available. Threading of rubber guide bar is facilitated by hand-lifting of two front guide bars. Spools up to 21-in. flange dia. are used.—Textile World, O, 152



WATER-POWERED WASHER

O. G. domestic clothes washer, made in Australia, is driven by an oscillating vane water motor during wash and rinse periods. For drying, vane motor is uncoupled by pin clutch and a water jet is directed against turbine blades on bottom of basket to spin-dry the clothes. An integral gas burner heats the water.—Prod Eng, O, 100

High Speed, Heat Featured In New Resin-Curing Range

High-speed, high-temperature resin-curing machines used at Avondale Mills cure thermosetting resins at speeds ranging from 20–200 yd. per min. The same unit can be used for regular tentering, processing for crease and crush resistance, and shrinkage control. Safety devices permit finishing with solvents. About 150 yd. of cloth are in the machine.

Goods to be processed are mounted in roll form at the back of the curing range. A pair of unwinding rollers unwind roll and pass it to scray. A microset paddler mangle applies the resin. Then cloth passes to a drier, air being maintained at 250° F. A hooded tenter receives cloth from drier, entry end is 280° F., delivery end is 300° F. Oil burner in curing oven holds temperature at any point up to 500° F. Resin-finished goods pass from the curing oven to cans cooled by circulating water and to cloth winders.

Pigment dyeing can be done simultaneously with resin application, the pigments being mixed with the resin.—Textile World, O, 123

Core-Binder Strengths

An investigation was conducted at Solar Aircraft Co. to determine essential differences in strength and gas content of various types of core binders. Seventeen binders of four general types—linseed base, petroleum base, urea resin, and corn starches—were tested.

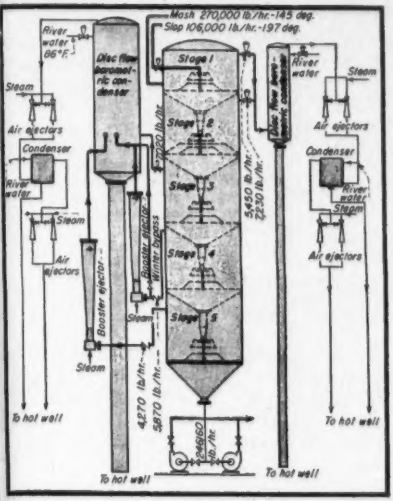
Six of nine oils tested gave highest strength with 400° F. baking temperature, whereas 300-350° F. gave highest strength for resin and cereal binders. Linseed-base oils had higher average strengths than other binders.

Least variations in peak strength occurred with petroleum base oils, and most variations with urea resins. Resins tended to migrate and give cores with low center hardness.

Cereal binders baked fastest and offered greater oven economy. Linseed binders were slowest baking, requiring an hour longer to reach peak strength. Resins and petroleum base oils required about the same time.—Foundry, O, 76

Ice Cream in Acetate Pails

Ice cream is being packaged in transparent acetate pails by Rosemarie de Paris, New York, for added eye appeal. Pail is made of 0.0075-in. thick cellulose acetate with beaded top and bottom and a cemented-in disk base. Top is of paperboard. Company hopes to substitute the top with an acetate lid if a method can be devised to level off the ice cream.—Mod Packaging, S, 100



COOLS DISTILLERY MASH

Hiram Walker distillery uses a multi-stage evaporator to cool distillery mash and slop (non-alcoholic residue). Evaporator has five stages, cooling from 197° to 75° F. Temperature of each stage is controlled by maintaining absolute pressure corresponding to desired temperature—the vacuum increasing in each stage. Auxiliary equipment includes booster injectors, controls, and control instruments.—Chem Eng, O, 122

Chain Quality Control Improves Transmissions

Quality control, starting with the raw material and progressing through each stage of subassembly to final proof-testing, has resulted in better, quieter synchromesh transmissions at Chevrolet-Toledo Div., General Motors Corp. The quality control, plus selective fitting of parts and lapping operations on improvised machinery, gives results comparable to costly gear and spline grinding methods.

All parts are inspected in "green" form after machining of individual gears and shafts. Each time a cutter is replaced, first piece is inspected completely for tooth profile, spacing, lead, and helix as case may be. Initial run from each shaver is checked for noise on a Red Ring gear speeder.

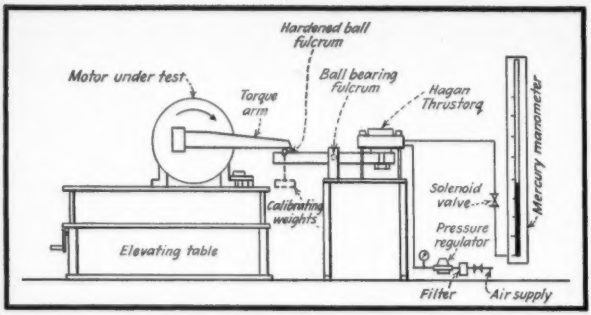
After heat treating another check is made; all ground parts are checked for dimensional accuracy and surface quality. In assembly stages, inspections are even more exacting. Synchronizer parts are selected to fit and each unit is machine-lapped. Final test is conducted in a sound room. Rejects at this point have been reduced to a negligible number.—Auto Ind, S 15, 32

British Exports Rising

Britain's export picture is looking brighter. For the first six months of 1948, exports ran $5,848,000,000 a year, about 33% above the 1947 figure. This was close to the goal. Imports were at an annual rate of $7,096,000,000. This figure is up about 10% above that expected, but was caused by the 10% increase in import prices. Export prices rose only 3%. At the present rate 1948 should close with a deficit of $128-million compared to the 1947 deficit of $768-million.—Business Wk, O 9, 117

Bristish machine-tool exports for January to June 1948 amounted to £8,140,163, compared with imports of £2,397,230. Best customer was India at £1,176,329; followed by Australia at £837,387; France and possessions at £755,541; South Africa at £687,058; and Netherlands and possessions at £584,265.

Imports from the U. S. accounted for over two-thirds of the total, amounting to £1,619,770. Germany furnished machines worth £315,033, while Switzerlan was third at £307,790. Of the German total, £273,468 went for used machines. Nearly 40% of the value of imports from Switzerland was for automatic lathes.—Mach, S 25, Overseas Trade Report Insert



TORQUE TESTS

Locked rotor test scheme, developed at Reliance Electric & Engrg. Co., substitutes a Thrustorq and manometer for scale and dynamometer. The Thrustorq is a balanced-diaphragm instrument in which applied force exerted through torque arm and beam is counterbalanced by air pressure.—Elec World, S 25, 122

Thallium Crystals Simplify Infrared Spectroscopy

Two developments at National Bureau of Standards have simplified infrared spectroscopy. One is the growing of large crystals containing 42% thallium bromide and 58% thallium iodide, the other the polishing of soft semiplastic crystals.

The prism so made has an index of refraction of 2.6 in the visible region and 2.2 at 40 microns. Observable range is up to 40 microns, compared with 24 microns for potassium bromide crystals. Investigations made so far in this region show polystyrene and polyethylene to be transparent and that many compounds containing chlorine, bromide, and sulphur have bands in this region.—Electronics, O, 202

Detects Rate of Wear

Ability of a bearing material to run on a journal material under controlled conditions is gaged with a compatibility tester at General Electric Co.'s Thomson Laboratory. Observations include degree of scuffing, welding and pickup on journal material, temperature rise, coefficient of friction, and rate of wear.

Apparatus consists of 1,800-rpm. motor, the shaft of which carries a test ring made from journal material under test. Against it is held, under spring pressure, a sample of the bearing material. Rate of wear is determined by dial indicator, while coefficient of friction is determined from wattmeter record showing additional power consumed by material when sample is rubbing on the ring.—Steel, S 20, 94

Variables of Padding

Amount of dye deposited on a fabric depends on dye concentration in the pad bath, percent pickup, and ratio of dye to solvent picked up. The first factor is controlled easily, but the others are more difficult to control.

It is often desired to decrease pickup when padding or squeezing is to be followed by drying. The less moisture retained, the greater is the pickup. Occasionally, decrease in pickup may decrease migration of non-substantive dyes before drying.

Preferential sorbtion of dye or solvent during padding is caused by progressive weakening of the solution or strengthening of the solution by the cloth's retention of too much dye. Solution is for the feed bath to have a different proportion of dye from the starting bath.

Cloth weight and porosity affect wetting speed in padding. Cloth should be in highly absorbent condition before padding starts. This can be done by efficient scouring and pretreatment by wetting agents.—Textile World, O, 124

Modern Industrial Safety

Measured in lives or dollars, occupational accidents exact an appalling toll, so improved safety records mean better morale, productivity, profit

AMERICAN INDUSTRY, compared with world-wide industry, is safe and getting safer all the time. Despite this fact, last year 17,000 men and women died in accidents in U. S. industrial plants. More than 2-million more were injured, and all accidents lost 280-million man-days of production.

Total cost of occupational accidents is estimated at more than $2½-billion a year, and of fire losses at $648-million. World industry too is in a comparable situation and can well look toward improvement in industrial safety.

Accident causes vary widely, so each plant should make a continuing analysis of accidents in an effort to prevent similar accidents in the future. But the first consideration is to make the plant as safe a place to work as possible by good layout and housekeeping, safe equipment, and proper guards.

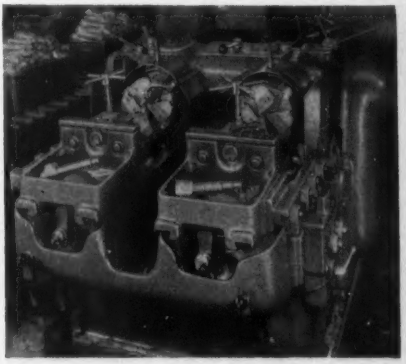
Good light is essential. It prevents accidents, as well as raising operating efficiency. Painting too is a factor in safety. An effective color program for machinery calls attention to danger areas. Stationary parts are usually painted a quiet color, while moving parts should be a color in strong contrast as light buff or light green. Color also is equally effective for other types of hazards.

Good floor construction and maintenance are vital in safety. Worn floors and slippery spots are danger areas. A good floor should be able to carry six times the moving load; it should be durable, easy to maintain, and not grow slippery with wear. Aisles should be clearly marked with painted lines.

Machine guards are mandatory for safe operation. Power-transmission guards should be provided to protect workers from moving parts, such as gears, belts, chains, flywheels. Points of operation also should be guarded adequately. Among recommended practices are countersunk setscrews, key guards, and metal-hooded abrasive wheels.

For punch-press work, protection methods include ⅜-in. maximum ram stroke, die enclosure, two-hand trip, two pushbutton trip, and gate, pull-out and sweep guards. Enclosure guards are usually considered the safest.

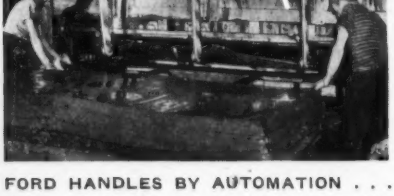
Personal protection, as well as plant safety, is required on many jobs. Thus, safety goggles may be needed, but the eye protection program should not stop at just providing goggles. Many U. S. companies have found that locating and



HIGH-PRODUCTION TURNING

When dieheads are used for high-production turning, threading machine should be converted to hydraulic feed for carriage. For machining steering-gear shafts as done here, feed rates are preset to suit machinability of material and finish required. A fixture at front of carriage clamps head of shaft. A receding spring pilot in bore of head centers shaft end with diehead. As work advances, center recedes into spindle. Such setups require large part quantities.—Am Mach, O 7, 92

correcting visual defects have paid for themselves in better safety and greater productivity. But correction of visual defects should be done by a specialist familiar with plant working conditions.



FORD HANDLES BY AUTOMATION . . .

Automatic devices at Ford Motor Co. accelerate production tempo, improve safety, lessen worker fatigue. Example is handling of frame rails, wherein paddles on hinged arms enter die, catch blank as it is released by vacuum cups, and cause it to slide onto turn-over at rear of press.

. . . TO USE MEN INTELLIGENTLY

Turn-over device, operated by linkage connected to press ram, catches blank and aligns it with roller conveyor by stop pins. Ram movement causes blank to turn over and fall on conveyor. Blank then travels, first to stacking and then to the forming press, all without manual handling.—Am Mach, O 21, 107

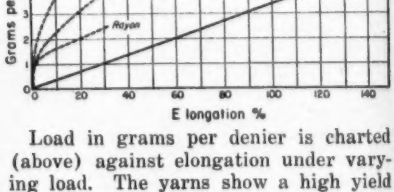
Other advisable protections are respirators where the air is contaminated, safety shoes having steel toecaps, hard hats where there is danger of falling objects, and safety clothing for protection against specific hazards.

Safety shoes are especially important in foundries or similar shops. Where explosive hazards exist, shoes should be of non-sparking type. For electrical hazards, safety shoes should be capable of withstanding 10,000 volts ac. for 3 min. without leakage of more than 10 milliamp.

Worker training too is extremely important in getting effective results.—Am Mach, O 7, 101

Rubber Knit-Goods Problem

Feeding of rubber thread, covered or bare, to knitting machines creates a real problem in knitted-fabric manufacture. Elastic property of the knitted structure is not sufficient to cover all uses so rubber must be introduced to accelerate and control recovery after stretching.



Load in grams per denier is charted (above) against elongation under varying load. The yarns show a high yield point; however, rubber yields immediately to even the slightest tension. Results will vary under different humidities.

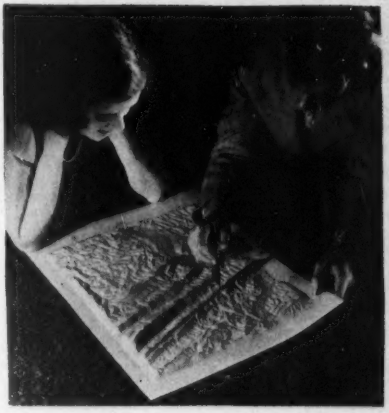
In 1 x 1 rib fabric where rubber is knitted in normally, two-way stretch is obtained. This use of rubber creates considerable difficulty in yarn feeding to obtain a constant fabric width. Difficulties are reduced when only width-wise rubber is used. It may be laid in between rib and plain wales without knitting.—Textile World, O, 139

Selective Shot Peening Extends Fatigue Life

Increase in fatigue life from 50 to 150% has been obtained at Curtiss Wright Corp. by selective shot peening of highly stressed areas of critical parts. Among items so treated are spiral bevel gears, fillets, bolt undercuts, and buttress threads.

Best results so far are obtained with a special heat-treated shot of 55 Rockwell C hardness. Shot size depends on part shape, radii, surface finish, and intensity desired. Part areas not to be peened are masked with rubber or steel. Either air or centrifugal blasting is satisfactory.

The correct intensity is established by fatigue tests. With each experimental part, one or more Almen specimens are exposed. Parts are then stress tested, and when optimum results are obtained, the Almen gage reading for the corresponding specimen is taken as standard for that particular part.—Am Mach, S 23, 95



MOLDED PLASTIC MAP

Light and durable, this molded plastic relief map is made of Vinylite sheets. Contour information is first transferred to an aluminum sheet. Plaster mold is made from the aluminum sheet. Pre-printed in three colors, the Vinylite sheets are heat- and pressure-molded over plaster. Map is an Aero Service Corp. development.—Cons Meth, O, 50

Small-Plant Cost Reduction

Duro-Test Corp., in the hope of effecting cost reduction within the plant, established three committees to meet monthly and handle problems of costs, cost reduction, and equipment. The plant production manager heads the cost and equipment committees and the chief accountant the cost-reduction committee. As a result of committee action, spoilage is down 60%, unit costs are down 10%, and labor efficiency is up 20%.

The cost committee is composed of production engineer, company treasurer, cost accountant, manager of engineering, superintendent of operating departments, and the production manager. Their scope is material, labor, and machines.

The committee on equipment is composed of the production manager, equipment manager, chief engineer, and departmental production heads. Great savings are realized through new machine designs and equipment selected by this committee.

The cost-reduction group concerns itself with improvement of existing methods and product design refinements leading to material and labor cost savings.—Factory, O, 91

Tailless Navy Fighter

The XF7U-1, Chance Vought's tailless Navy fighter, has passed initial flight tests. Powered by two Continental 24C jet engines located at wing roots, plane uses elevon control developed for flying wings. Two vertical fins in wings give added stability. Leading edge flaps increase lift characteristics of the swept-back wing at low speeds.—Aviation Wk, O 18, 11

NEW PRODUCTS

New Printing Emulsion—A synthetic, non-creaming thickener for natural or synthetic latex, called Polyco 296, will not support bacteria and is not subject to rotting, scouring, and mildewing. Based on acrylate copolymers, it can be diluted with hot or cold water. The American Polymer Corp. development is non-oxidizing, non-yellowing, stable in presence of heat, and resistant to oils, fats, and aliphatic solvents.—Textile World, O, 240

Airtight Tire Tube—Treating the inside of aircraft tire tubes with a special chemical makes the tube leakproof. Air pressure is held at near constant level reducing wear and damage from underinflation. Firestone Tire & Rubber Co. developed the tubes.—Business Wk, S 25, 83

Preserves Wooden Pipes—Pentachlorophenol mixed with light oils prevents decay or insect attack on wooden or wood-lined pipes. Practically colorless, the preservative does not prevent paint from adhering to the treated surface. It is a Dow Chemical Co. development.—Eng News-Rec, O 7, 18

Trench Digger—Runabout ditcher, offered by Barber-Greene Co., cuts trenches 5½ in. wide and down to 4 ft. deep. It has ten digging speeds and can cut through frozen ground.—Oil & Gas J, O 14,124

Motor Rubber-mounted — Fractional-hp. ac. motors mounted in rubber provide quiet operation for heavy-duty applications. Announced by Kingston-Conley Div., Hoover Co., units are rated up to ½ hp. at 1,725-3,450 rpm.—Prod Eng, O, 176

Bakes Cores in Sec. — Induction Heating Corp.'s dielectric conveyor-type oven bakes foundry cores in 20 sec. to a few minutes by electronic heating. Oven is adaptable to other uses.—Chem Eng, O, 141

Burns Three Fuels—One burner on Orr & Sembower, Inc., boiler handles light oil, heavy oil, or gas. Changeover can be made in 10 min. Sizes range from 525 to 7,000 lb. per hr. of steaming capacity.—Power, O, 184

Portable Compressor—The Pac-Air is a self-contained, air-cooled, unit built by Ingersoll-Rand Co. Powered by gasoline engine, the 2-cyl., single-stage compressor has displacement of 37.5 cfm. at 80 psi. Unit is mounted on pneumatic tires.—Elec World, S 25, 142

PLASTIC PERSONNEL BOAT

Attention getter at National Plastics Exposition was this 28-ft. long by 10¼-ft. wide Navy boat made of a Fiberglas T-36 mat and Selectron Resin. Built in a two-part aluminum mold, it took eight men 6 hr. to complete the plastic hull.—Am Mach, O 21, 134

Four-engine Executive Plane—First flight has been made by Monsted-Vincent Aeronautical, Inc.'s, 4-engine executive-type pusher plane. The all-metal plane, powered by four 85-hp. engines, seats five including pilot. Cruising speed is 145 mph.; fuel supply is sufficient for 8-hr. flight at that speed. Gross weight is 4,800 lb.; span, 48 ft.; length, 34 ft.—Aviation Wk, O 18, 15

Photoelectric Counter—Counter type 20AP5, offered by Photoswitch, Inc., is general purpose unit for conveyors or automatic machines. Designed for 115 v. and 60 cycle, it has adjustable lens system to allow narrowing light beam for counting small objects.—Elec C&M, O, 90

Diecasts to 10 Lb.—Hydraulic Press Mfg. Co. has developed a self-contained cold-chamber diecasting machine for mass production of aluminum castings up to 10 lb. It also handles magnesium and copper-base alloys.—Iron Age, S 9, 95

Clay Spade—Only 19 in. long and weighing 18 lb., Le Roi Co.'s clay spade is designed for ease in holding and for lowered digging costs. Oil is metered into steam line and carried to all moving parts. Cylinder, handle, and retainer are forged to form a tough, armor-clad tool. Spacing and chuck bushings are renewable.—Cons Meth, O, 88

Dial-scale Mechanism—A basically new dial-scale mechanism, introduced by Yale & Towne Mfg. Co., is said to achieve straight-line relationship between load and pointer movements without special cams. Engagement between pointer rack and pinion is made by permanent magnet. Capacity is 25 lb.; with linkage, the capacity is raised to 50 lb.—Food Ind, O, 170

Regulates Temperature—Quick-action regulator has a stainless-steel snap action mechanism, stainless-steel bulb and line, one-piece bellows, and bronze valve body. It is offered by Manning, Maxwell & Moore, Inc.—Oper Eng, O, 66

Rock Salt Improves Tire Tread—Rock salt mixed into rubber during compounding improves tread's ability to stop car on icy road. As tires wear, rock salt drops out, leaving small pits in tread to improve gripping. On lake ice, the new U. S. Rubber Co. tire stopped cars 30% quicker than new tires.—Business Wk, S 4, 60

Plastics Molding Press—One-piece frame, 50-ton No. 235-A press, offered by F. J. Stokes Machine Co., has slow-close automatic control. High pressure can be applied at any point in molding cycle.—Am Mach, O 7, 146

Revolving Scoop—Designed to clean corners, load gravel, coal, earth, aggregate, and snow, a new full-revolving, cable-crowding scoop operates from all angles. Capacity is from ⅜-⅝ cu. yd. Designed for Models E and J Quick-Way Truck shovels, scoop is interchangeable with other attachments. Scoop was developed by Quick-Way Shovel Co.—Eng News-Rec, O 14, 124

Competes with Porcelain—A synthetic enamel finish, called Superclad, has been developed by Sherwin-Williams Co. Highly resistant to acids and alkalis, it is now being used on washing machine tubs and for similar coating jobs.—Chem Eng, O, 168

Controls Rodents—Developed by LFC Corp., the Guard has metal case enclosing electronic unit, motor for driving electrocuting arms, and mirrors for light system. Unit is placed over rat run; when rat breaks light beam, it is electrocuted and ejected.—Electronics, O, 134

Radiant Glass Clothes Dryer—Developed by Continental Radiant Glass Heating Corp., a 36x34x24-in. cabinet dries a 10-lb. wash at ironing speed. Two 16x24-in. radiant glass plates with fused aluminum elements supply heat from bottom. Steel rods, equivalent to 60 ft. of clothes line, hold wash. Maximum temperature inside is 190° F.—Elec Merch, O 15, 13

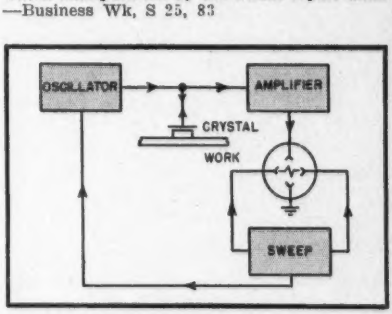
Small Bituminous Compactor—Weighing only 230 lb., a new gasoline-powered bituminous impactor strikes 1,750-2,000 blows while paving a strip 35-42 ft. long 35 in. wide. Unit works right up to curb. For widening and patching work, the unit moves forward under its own power. Impactor and finishing shoe are heated by exhaust. It is a Wayer Impactor, Inc., development.—Cons Meth, O, 82

Fights Fires—Type FFF Fogfoam nozzle, suitable for extinguishing liquid fires, has a screen that discharges a wide protective pattern. Foam shaper also is available in the Rockwood Sprinkler Co. development.—Oper Eng, O, 66

Metal Primer—Vinsynite primer, developed by Thompson & Co., has strong adhesive powers. It can be applied on damp or slightly oily surfaces and requires no preliminary etching or solvent washing.—Prod Eng, S, 180

Hydrogen Kills Arc—Durakool, Inc.'s, mercury switches have hydrogen gas sealed in under pressure to kill the usual arc between mercury and contact points and to eliminate electrode corrosion. Models range from 1 to 65 amp. in capacity.—Elec World, O 9, 140

Cleans Watches Automatically—L. Lasker & Co. has designed a machine that cleans and dries watches automatically, eliminating watch manipulation by the watch repair man.—Business Wk, S 25, 83



ULTRASONICS CHECK THICKNESS

Sperry Reflectogage measures thickness of material by ultrasonic waves. Oscillator produces electrical variations impressed across crystal which transforms voltage into longitudinal physical vibrations that travel through the work at fixed velocity. Waves reflected by opposite side cause variations in voltage across crystal and amplifier, so beam of cathode-ray tube is depressed vertically. These pips are thickness indications.—Electronics, N, 76

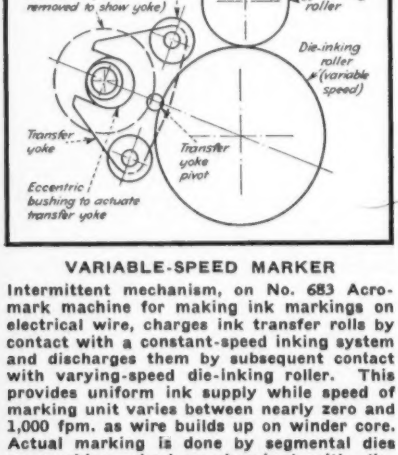
NEW PRODUCTS

Improve Dragline Bucket—Operation efficiency is improved by placing the center of gravity in Berner Engineering Co.'s dragline bucket slightly to the rear of the normal position. Bucket thus can be hoisted sooner without spilling. Average saving in time is 29% per cycle. Buckets range from 1¼-12 cu. yd.—Eng News-Rec, O 7, 18

No Electricity Needed—Kemode Mfg. Co.'s new soldering iron requires no electric current or external heating. Iron is heated in 5 sec. by chemical cartridge placed in copper tip. Iron will stay hot for 10 min.—Weld Eng, O, 92

Converts Drill to Saw—Electric drill can be used as a power saw with Future Products Co.'s Lite-saw attachment. The attachment will turn a 6-in. rotary blade.—Business Wk, S 11, 72

Checks Helical Gears—National Broach & Machine Co.'s new Red Ring checking head rolls work gear with master under pressure. It determines helix-angle wobble, size, eccentricity, and roll roughness.—Iron Age, S 30, 69


Transfer rollers
2nd ink roller (constant speed removed to show yoke)
Spreading roller
Die-inking roller (variable speed)
Transfer yoke
Transfer yoke pivot
Eccentric bushing to actuate transfer yoke

VARIABLE-SPEED MARKER

Intermittent mechanism, on No. 683 Acromark machine for making ink markings on electrical wire, charges ink transfer rolls by contact with a constant-speed inking system and discharges them by subsequent contact with varying-speed die-inking roller. This provides uniform ink supply while speed of marking unit varies between nearly zero and 1,000 fpm. as wire builds up on winder core. Actual marking is done by segmental dies on marking wheel synchronized with die-inking roller.—Prod Eng, O, 98

Versatile Sinker-top Unit—A 24-in., 24-feed sinker-top machine has been developed by H. Brinton Co. Unit has 3-position design and 4-color changers. It will produce plaids, jacquards, variable-stripes, and patter effects in almost unlimited colors and designs. Special feature is tuck bars on all feeds to change from fancy-wheel to plain jersey automatically.—Textile World, O, 151

Portable Boiler—Self-contained, natural-gas-fired boiler develops 15,000 lb. per hr. of steam at 500 psi. The unit is 9 ft. high, 8 ft. in dia. Gas pilot light ignites fuel. It is offered by Vapor Heating Corp.—Power, S, 112

Air-conditions Crane Cab—To protect crane operator from heat, dust, and gases of manufacturing plants, Dravo Corp. has designed a 5½x2x3-ft. air conditioning unit. Working in temperatures up to 130° F., the unit keeps cab at 80-85° F. in summer, 70° F. in winter. Unit is mounted beside crane cab or on adjoining catwalks.—Business Wk, O 9, 77

Tiny Fluorescent—A 1-w., 110- to 125-v. fluorescent bulb the size of a walnut has been developed by Westinghouse Electric Corp. for use as a night light. A plastic, prong type base plugs into any standard outlet, ac. or dc. Average bright life is 3,000 hr., 10,000 to burn out.—Elec Whols, O, 94

Improve Wheat Starches—General Mills, Inc., has announced two modified-purified wheat starches. A-22 is especially adaptable as thickener and stabilizer in homogenized baby food, while B-24 is intended for confectioners' use.—Food Ind, O, 137

Feeds Small Objects—A vibratory vertical bowl designed to feed powdered materials or small objects down to extremely small quantities and stream size has been developed by Syntron Corp. Electro-magnetic action moves powder up a spiral track.—Eng & Min J, O, 120

For Steel Mills—Adaptable for use totally enclosed nonventilated or separately ventilated, 600 series dc. steel-mill motor offered by Crocker-Wheeler Electric Mfg. Co. has shortened bearing housings and careful proportioning of field-pole design. Split brushes and four interpoles improve commutation.—Steel, O 4, 123

Two-table Contour Miller—Onsrud Machine Works, Inc., has developed a rotary-table contour milling machine for mass production of parts up to 18-in. over-all dia. Designed for non-ferrous metals, it has two tables so one can be loaded while other is in operation.—Am Mach, S 23, 151

WEATHER-WISE AWNING

No attention on part of householder is needed to lower awning made by Automatic Awning Co. It operates by gathering water in canvas holder which lowers it. When rain stops, water drains out so reduced weight allows awning to rise. Lightweight is achieved by welding framework of aluminum-alloy tubing. Awning can also be operated by cord.—Weld Eng, O, 68

Converts Tub to Washer—With Victor Electric Products, Inc.'s, new Tub-O-Wash, a laundry tub can be converted quickly into an electric washing machine. Weighing 30 lb., unit clamps on side of tub or is available on a separate stand. It is swung up out of the way at the end of washing.—Hardware World, S, 90

Sensitive Relay—BK relay, offered by Allied Control Co., Inc., is recommended for conditions of limited power supply and where precise operating characteristics are vital. Dc. coil rating is 32 v. at 24 mw., ac. coil rating 220 v. at 0.240 va.—Elec World, Ag 28, 110

Maintains Temperature—Model 400A bridge-controlled thyratron thermostat, announced by Spencer-Kennedy Labs., Inc., can maintain temperatures of 20-1,200° C. within plus or minus 0.1° C. Use is with furnaces, chemical baths, ovens.—Electronics, O, 134

Power Wheelbarrow—The Kwik-Mix Co. wheelbarrow is powered by an aircooled 3.9-hp. gasoline engine and has forward and reverse speeds of 2-4 mph. Capacity of dump body is 10 cu. ft. or about 1,000 lb.—Steel, S 27, 123

Boosts Batteries—Willard Storage Battery Co. has developed a battery booster to be mounted on car fender. Rubber feet prevent scratching. Current ranges from 6 amp. for slow charging to 75 amp. for quick charging. Three 6-v. batteries can be slow-charged at once.—Business Wk O 2, 77

High-tension Conveyor Belting—Called Raynile, a new high-tension fabric conveyor belting is designed for tension loads up to 1,000 lb. per in. of width. Belting is a combination of rayon and nylon. It has excellent transverse flexibility, minimum stretch, and is simple to splice. Belting is a development of Hewitt-Robbins, Inc.—Coal Age, O, 184

Electronic Air Filter—Developed by American Air Filter Co., the new filter is basically an electronic precipitator without an ionizing unit. It contains a collector element of electrostatically charged laminated cellulose paper. Efficiency is intermediate between mechanical and precipitator types.—Foundry, O, 258

Dual-diesel Unit—Designed by Detroit Diesel Engine Div., General Motors Corp., for industrial service, unit has two 4-cyl. diesels mounted on common base and geared to single shaft. Four power-takeoff arrangements are available.—Power, O, 158

Powdered Metal Press—F. J. Stokes Machine Co. has developed a 12-ton capacity press for high speed production of powdered metal parts. Pressure is applied simultaneously from both top to bottom. Movable core rod assures even distribution and full die cavity before pressure is applied.—Auto Ind, S 15, 52

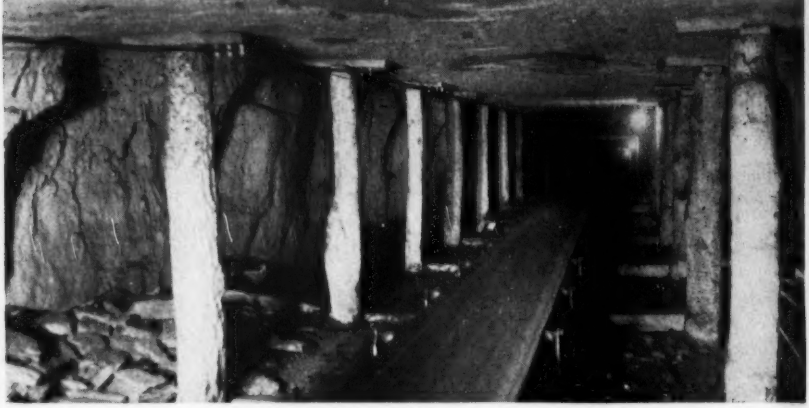
Street-lighting Economy—Line Material Co.'s Directolite luminaire is for small communities or where economy is a major factor. It is available in one asymmetric and two symmetric styles, and may be used on multiple or series systems.—Elec West, S, 70

Non-corrosive Thermoplastic—Developed by U. S. Rubber Co., Versalite is a combination of synthetic rubber of acrylonitrile group with a synthetic resin. Non-corrosive, it is being used for new-type food shipping containers and other products.—Prod Eng, O, 176

Makes Car Glow—Minnesota Mining & Mfg. Co.'s new sheeting for automobiles makes car bodies glow at night when struck by light from approaching car. Available in all colors, sheeting can be printed to simulate wood paneling.—Business Wk, S 18, 22

FREE SERVICE TO READERS

As a special service to our subscribers, McGraw-Hill Digest will furnish, without any charge, additional information about any new product or technical development described. Address your letter to: The Editor, the McGraw-Hill Digest, 330 West 42nd St., New York 18, N. Y., U. S. A. —THE EDITORS



LONG USE makes rules possible for installation of . . .

Coal-Mine Conveyor Belts

Selection of belting depends upon conditions existing in mine. Belts should be transferable within mine. Good track rules apply to conveyors

AFTER 25 YEARS of use in United States coal mines, general rules for selection, installation, operation, and maintenance of conveyor belts can be laid down.

Selection, of course, depends upon natural conditions existing in the coal mine. For section belts to be used in seams 40-in. thick and over, a type of frame section that comes apart in a small number of components is advisable, reducing the number of sections necessary to be handled. In low coal—30–36 in. thick—sections should be small to facilitate handling. Close timbering will restrict size of sections.

Frame structure and method of joining must be rigid enough to maintain alignment.

Power necessary to drive the belt depends on belt width, maximum length, speed, loading, and grades. If territory has widely varying grades or if seam is of uniform pitch and belts will be inter-changed on both adverse and favorable grades, all drives should he high powered. A 40-hp. drive will normally handle 30-in. section belt with a maximum length of 2,500 ft. and carry coal up a 4% grade if load is not excessive. With the same belt length and load but working down a 4% grade, a 25-hp. drive is sufficient.

If 30-in. belts are used for main conveyors, it may be wise to use the same size belting rather than a narrow belt for feeder conveyors. This permits switch of belting between mother and feeder belts.

Although carrying side has long been used flat, conveyors with trough idlers have proved much superior. Now most belts are operated flat but on idlers instead of dragging on a plate. Best angle for idlers is debatable. Standard range is 20 to 25°—most operators preferring the former because of better troughing and loading and less edge wear.

Whether to use self-aligning idlers

depends on belt size and tonnage to be moved before belt must be moved to a new location. It is agreed that section conveyors 2,000–2,500 ft. long do not need idlers. Mother belts may.

Belting specifications depend on maximum length, grades, size of lumps, and whether rock will be moved. Belts of synthetic fibers have higher load ratios than other belting. Splices in belts for excessive lengths should be vulcanized.

Canvas ply can be too heavy and/or piles too numerous to permit proper troughing of belt. Three-ply construction is the minimum, 4-ply the most common. If coal without sharp edges is to be carried, top covering should be at least $\frac{1}{16}$ in. thick; otherwise, top covering should be $\frac{1}{8}$ in. thick. Trend is to a general minimum of $\frac{1}{8}$ in. A grizzly is sometimes used in loading so that fines can cushion larger lumps.

Close to perfect alignment of the conveyors is essential. Head end must first be aligned and leveled. All boom, drive tail, and snub pulleys must be square with longitudinal members. There can be no settlement of footings. Good rules for track-laying apply to setting up conveyors. They can be laid through local rolls and dips.

When starting a new conveyor or a new belt, the belt may not train properly without load but will when load is applied. Edge wear is severe at this point but can be reduced if troughing idlers are tipped out of vertical from 1 to 2°.—Coal Age, O, 80

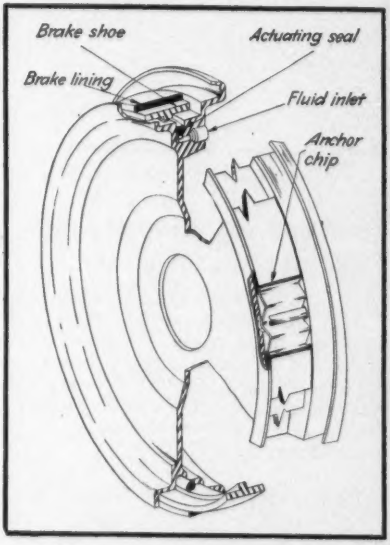
Cheap 4-Place Plane

Atlas Aircraft Co. hopes to market an all-metal, 4-place personal plane soon, to sell for $2995. Plane may be powered by a 220-hp. engine; landing gear will be retractable. Fuselage will be fabricated in four sections, then fused. The wing is to be in one piece. Fuselage will be placed on the wing and fastened with extrusion on each side—saving fittings and time.—Aviation Wk, Ag 23, 18

Grinds Artificial Pearls

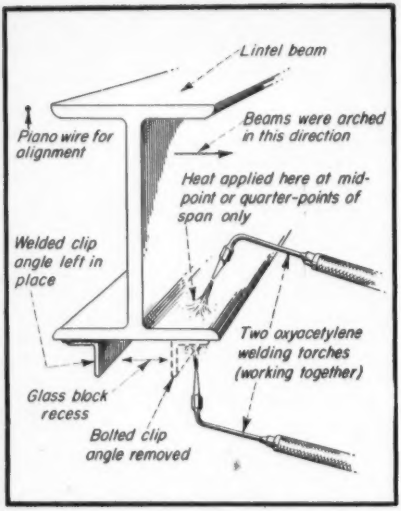
Artificial pearls and beads can now be made by centerless grinding. The beads are ground from perforated rods of plastic or other materials, rod diameter being equal to diameter of bead to be produced.

The wheel is crush-dressed, then fed against the plastic rod until a string of beads equal in length to width of wheel has been ground. A fine silky, lustrous finish is obtained. The small stem connecting adjacent beads is removed in a subsequent operation. Production rates go to 3,500 per hr.—Mach, O 16, 806



AIRPLANE-TYPE AUTO BRAKE

Radically new automobile brake, developed by Glenn L. Martin Co., has 50% fewer parts than conventional brake. It uses continuous ring seal that fits in groove in brake-shoe support. Hydraulic fluid, actuated by brake pedal, enters groove and forces seal outward to apply brake shoe in nearly a 360° engagement with drum. Five working segments of lining, separated by anchor clips, provide large braking surface and reduce lining wear.—Prod Eng, O, 167


Lintel beam
Beams were arched in this direction
Piano wire for alignment
Heat applied here at mid-point or quarter-points of span only
Welded clip angle left in place
Two oxyacetylene welding torches (working together)
Glass block recess
Bolted clip angle removed

TO COUNTERACT lintel beam warping . . .

Torches Bring Warped Beams Back Into Shape Quickly

After completion of all steel work on a glass-walled building, F. H. McGraw & Co., contractors, found 50 exterior lintel beams and channels so warped that expansion slots were out of line with glass-block panels. Warping was the result of careless welding of clip angles or rough handling during shipping.

Two oxyacetylene torches were used to heat bottom flange simultaneously at the outside of the bow. When deflection was 1 in. or less, heat was applied at mid-point only. When deflection was over 1 in., heat was applied first at mid-point and then was applied at quarter-points.

Heating time was 60 sec., and metal was cooled without quenching. Hot area against cold metal was sufficient to spring the entire member back into shape. Entire job took only 40 hr.—Cons Meth, O, 58

Triple-Circuit Line Cuts Lightning Area

A triple-circuit 25-kv. line was built recently to transmit 30,000 kw. about 3¼ mi. through an area of severe lightning exposure. This unusual line is carried on braced H-frame structures.

Lightning protection is afforded by ground wires and increased impulse strength. Two ground wires, 9¼ ft. above the top conductors, give a shielding angle of about 30°. Phase conductors are supported by strings of three 10-in. suspension insulators with 5¾-in. spacing. There is 5 ft. of wood between them and nearest ground wire. This combination of wood and porcelain provides more impulse strength than the pin-type construction.

Grounding at each pole consists of a solid copper coil extending up 8 ft. Overhead ground wires are tied together across the top of each structure and connected to ground coils. At angles, grounded anchor guys, instead of copper risers, are used as ground leads.—Elec World, S 25, 87

Seals Electronic Devices

The Ordnance Research Laboratory of Pennsylvania State College has been successful in hermetically sealing plug-in units, assemblies, and complete electronic devices. Purpose is to provide protection against high humidity, salt-water spray, and fungus growth, such as exist in geophysical prospecting, airborne, and other services.

By employing sealed-in units—tubes, sockets, transformers, relays, capacitors, and tuned circuits—it has been possible to seal subassemblies and even large components.

For simple devices, all the critical or high-impedance circuits can be placed in one chassis. More complex devices can be built of subassemblies, each of which is constructed in a plug-in type hermetically sealed container.—Electronics, N, 80

"WINCH-LIFT" DUMP TRUCK

Bed of this "winch-lift" dump truck is raised by winch cable and sheave-block assembly powered by engine takeoff. Made in 8-, 20-, and 30-cu. yd. sizes for coal hauling, the 8-cu. yd. unit weighs one-half that of other semi-trailer dump models. It was developed by Winch-Lift, Inc.—Coal Age, O, 191

Sealed Beam Lamp Developed For Lighting Streets

Tests are now being carried on to determine suitability of a new Sealed Beam lamp for street and highway lighting. Developed by Sylvania Electric Products, Inc., it offers the advantage of easy maintenance.

The first demonstration showed that the most important change effected by the lamp was redistribution of light flux from outside the curb line to the main pavement beam between curb lines. Lens and filament changes are partly responsible; reflector control is primary factor.

Output of perhaps 80% is consistent with luminaire efficiencies. Sizes probably will be 1,000 and 2,500 lm., as smaller or larger lamps may be uneconomic in design. Samples of the new lamps are now available.—Elec World, S 25, 97

Cut Spoilage 73% in Year

By adopting a scrap and spoilage report system, Dexion, Ltd., England, cut its spoilage 73% in the first year of operation. Each time a job is scrapped, a machine breakage occurs, an error is made, or a long production delay is encountered, the foreman makes out a report. It lists nature of the trouble, effect, cause, and preventive steps to be taken to prevent repetition.

The form helps to spot accident-prone employees and which machines continually need attention.—Factory, O, 116

Mountain-Top Oil Drilling

Drilling for oil in areas practically inaccessible because of rough terrain can often be done by following a method developed in California. The field to be drilled was not only rough, but also subject to slides.

The practice in this field is to select a site, build roads to this spot, and grade location. On this "island", a huge, reinforced concrete slab is laid. From this slab, wells are whipstocked out so the bottom of each is located in the center of a separate 5-acre plot.

As many as eight wells are drilled from a single slab with one drilling rig. After completion of all wells, a single derrick serves the entire island, being slid along on rails from well to well as needed.

The Texas Co. in following this method keeps wells straight to about 500 ft., sets the first whipstock, and deviates at the rate of 2½° per 100 ft. Deviation is usually kept at 9–10°. Three whipstocks per well are required on the average, although as many as six have been used.—Oil & Gas J, O 7, 212

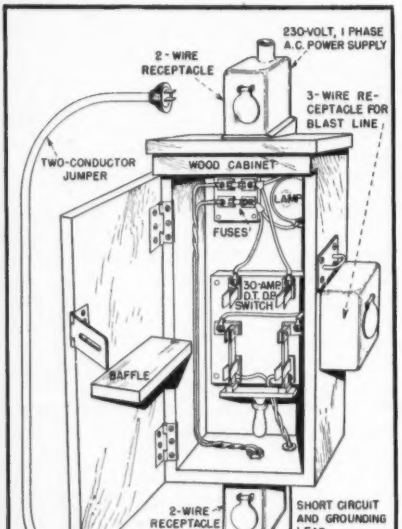
Nickel Alloys Have Unusual Elastic Properties

Developed over the past few years, new nickel alloys have controlled elastic properties, are age-hardening, and can be heat-treated from annealed condition or from any degree of cold working to obtain high physical properties.

Ni-Span C (International Nickel Co.) is a constant-modulus alloy used in structural parts for instruments and devices when parts must maintain constant elastic properties with change in temperature. Examples are tuning forks, strain gages, bourdon tubes, and proving rings.

Ni-Span Hi is an high-expansion alloy with coefficient of expansion near maximum possible with an austenitic alloy. Use is for special springs.

Ni-Span Lo is a low-expansion alloy having an expansivity slightly greater than invar. It is applied in instruments where high strength and low expansion coefficients are essential. Ni-Span Lo-42 (42% Ni) is used for arbors for carbide-faced rolls and as backing material for carbide tipped tools.—Prod Eng, O, 126



FOOL-PROOF BLASTING SWITCH

Baffle on this blasting-switch-box door prevents switch from being put in firing position when door is closed. Switch must be down when door closes. Power supply is kept out of switch except for firing periods to permit replacement of fuses and lamp.—Eng & Min J, O, 110

Electronic RPM Counter

Turbine components for new jet engines are whirled at nearly 100,000 rpm. and under temperature conditions of 1750° F. at Boeing Airplane Co. propulsion laboratory. Wheels are tested for effects of weight and tensile strength of materials, for rim-loading of blades, for blade profile, and for shaft-hole design.

One end of the spinning turbine shaft is divided into two sections—half white, half black. A phototube, focused on the shaft, sends a current impulse to recording instruments each time a black portion passes its scanner.

High-speed photographs are made at wheel-failure points. The tripper consists of double concentric copper screens lining the test pit. At bursting point, pieces crash into screens, pushing them into contact and completing flash circuits of a mercury lamp.—Electronics, O, 144

Fiberglas Parachute Pack

Fiberglas impregnated with a polyester-type resin is being used by General Textile Mills, Inc., to make a high-strength, lightweight parachute pack. Made in two pieces—20-in. dia. and 8-in. deep dish-like section and cover—chute will be used by the Navy to drop ordnance materiel. It is not affected by extreme heat or cold. It weighs 7 lb.—Aviation Wk, S 13, 32

MECHANICAL PICKING is increasingly important in . . .

Selection by Cotton Varieties

Mill men are now specifying cotton orders on variety as well as grade and staple length. End product must determine proper cotton variety needed

COTTON MANUFACTURERS are growing more conscious of cotton variety in selection of raw materials. Previously most mills bought cotton only on grade and staple-length specification. Data compiled by *Textile World* shows that variety is equally as important in cotton choice as are the other two factors. End product desired makes choice by variety a necessity.

Cotton breeders now are interested in producing new varieties that both produce well and spin well in mills instead of only producing well, as previously.

One new fiber, produced only this year, is Acala 4–42, developed from Acala 1517. The new fiber averages 1⅛ in. long, slightly shorter than the parent fiber (1⅛ in.). It retains the parent fiber's high tensile strength but it is coarser and less neppy.

Several conditions are known to affect cotton beside variety, area of growth, and season. The variableness of cotton properties is entirely due to factors other than variety. Time of picking, exposure, method of picking, moisture content, ginning, and baling vary the quality.

Mechanized picking is expected to affect the character of short-staple cottons. Breeders must produce types with coarser fibers which will clean more easily. But coarseness can have no effect on spinning quality. Hairy leaves of most varieties now grown are a handicap in mechanical picking. Cleaner machine picking might be possible with smooth-leaf varieties. Long-staple varieties probably will not be machine-harvested since fibers are damaged too much by ginning and mill cleaning.

Varieties selected for test account for

80% of the cotton grown in the United States. They are Deltapine, Stoneville 2B, Coker 100, Acala 1517, Acala P18C, Acala 4–42, Hibred, and Rowden. Their characteristics are:

Deltapine—It has high yield and lint turn-out, good fiber and spinning qualities. Length uniformity is slightly irregular to good; maturity is average to very mature; fiber strength is weak to very strong; neppiness varies from low to high.

Stoneville 2B—Popular fiber for many years, it has good fiber quality. Uniformity is slightly irregular to good; fineness, fine to average. Maturity ranges from immature to mature, strength is fair to very good.

Coker 100—This fiber is wilt resistant and has good yield. Fiber uniform is slightly irregular to uniform; fineness, fine to average. Maturity is average to very mature and strength is weak to very good.

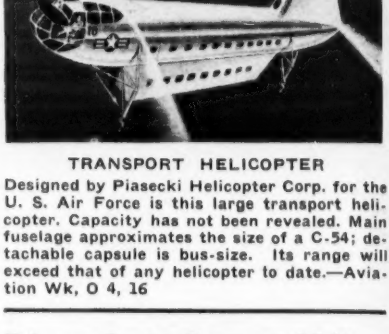
Acala 1517—Fiber has good yield and wilt resistance but uniformity is slightly irregular to uniform. Fineness ranges fine to average. Maturity is average to mature and fiber strength is average to very good.

Acala P18C—It has average to good length uniformity; fineness is fine to average; maturity is average to very mature. Fiber strength is weak to average.

Acala 4–42—The new variety, grown in California, has average fiber uniformity, fiber strength, and fineness. Maturity is above average.

Hibred—Fiber length uniformity is average to good; fineness is average to coarse; maturity is average to very mature; fiber strength is fair to very good.

Rowden—Maturity is good to very good; fineness is slightly coarse to coarse; fiber length uniformity is average to good. Maturity is good to very good. Fiber strength varies widely from average to excellent.—Textile World, O, 107



TRANSPORT HELICOPTER

Designed by Piasecki Helicopter Corp. for the U. S. Air Force is this large transport helicopter. Capacity has not been revealed. Main fuselage approximates the size of a C-54; detachable capsule is bus-size. Its range will exceed that of any helicopter to date.—Aviation Wk, O 4, 16

Fringe Costs Run to 11%

Fringe costs in 61 textile mills employing 26,166 hands, surveyed by the Rhode Island Textile Assn., ran to 11% of the total payroll. These costs do not include pension and retirement program, year-end bonuses, housing, or company transportation. As much as 6% more would be added to the bill if social-security taxes, unemployment insurance, and workmen's compensation payments were included.

Automotive & Aviation Parts Manufacturers, Inc., figure that fringe costs in its field run to 12¼¢ per hr. of payroll costs.—Business Wk, O 2, 100

Browning Inhibitor Unsafe

Research studies made in Palestine indicate that thiourea and allylthiourea prevent darkening of banana slices during dehydration. These substances are goitrogens, and their use in foods for human consumption cannot be recommended.

As little as 25–50 mg. a day keeps down thyroid activity in hyperthyroid conditions. Evidence to this effect is found in the fact that they have been used in animal feeds as thyroid depressants to permit rapid weight gain.—Food Ind, O, 125

Planned Maintenance Program Means Lower Product Costs

Five-step program places emphasis on preventive maintenance as a means of reducing corrective work load. Control cards guarantee its success

— Report to Management —

PRODUCT COST can be reduced through lower plant maintenance costs. This requires efficient control of maintenance—both corrective and preventive. Savings can be made only if a maintenance system is adopted after careful study of the requirements followed by efficient planning.

A five-step program to reap this benefit can be modified to suit the particular need of the plant in question. Essential steps are:

(1) Determining the maintenance work load;
(2) Scheduling the work load;
(3) Getting the job costs;
(4) Measuring the achievement; and
(5) Reporting to management.

It is surprising how many well-run plants do not know the amount of time lost through downtime or the cause of that downtime.

Who should control maintenance? It is a function of the plant engineeer. He should not be a member of the production department. Separation of the production and maintenance departments serves many purposes. Through the separated system, management can check on improper use of equipment by production or find cases of inadequate lubrication by maintenance.

Working with the plant engineer may be a maintenance superintendent or foreman and, by all means, a clerk. The control system to be described is based on records and a clerk is a necessity.

Of the two types of maintenance, preventive is by far the more important. It substitutes the labor costs necessary to hunt up and correct minor repairs for the cost of waiting until those minor repairs become major breakdowns.

Determining Maintenance Load

Most maintenance work is based on written or oral requests for maintenance received from various departments throughout the plant. This is improper—at best inefficient. Properly there should be a staff of trained inspectors whose sole function is to make periodic checks of equipment to determine the necessary work. From the inspector's reports, the plant engineer can direct preventive maintenance necessary, reducing the corrective work load.

Schedule forms should be available for each inspector with space provided for name and number of each piece of equipment checked and what is to be inspected on each machine. There should be daily, weekly, and monthly schedules as necessary.

In one electrical-motor plant, the inspection form provides space for the

FIVE-STEP PROGRAM

Determining Work Load
Scheduling Work Load
Getting Job Costs
Measuring Achievement
Reporting to Management

inspector to check off each piece of equipment when it is checked and space for his signature. Space is provided for necessary repair work. This puts the responsibility for proper functioning of equipment squarely on the inspector.

To prepare a complete preventive maintenance schedule:

(1) Prepare a list of all equipment, each piece on a separate card;
(2) Identify each piece of equipment with a number;
(3) Determine the proper type of inspection necessary for each piece of equipment;
(4) Sort cards of group 1 according to group 3 classifications;
(5) Determine frequency of inspections; and
(6) Prepare inspection schedules by type of inspection for each day of the week, to balance work and to provide adequate inspection previously determined.

Scheduling Work Load

Having determined the nature of the work load, this load must be translated into action. Verbal instructions are not enough. A written job order for each maintenance job should be filled out. By using written requests for maintenance the plant engineer knows the amount of work ahead of the department and can schedule the work according to its urgency, thus utilizing the maintenance crews' time more efficiently. An indirect benefit to the plant engineer from written requests is that it provides a check to determine whether maintenance men, permanently assigned to one department in the plant, are necessary full time in that department.

This policy of assigning maintenance to special departments on a permanent basis is quite frequent. It is done because of the "urgency" of repairs in those departments. In one plant, having such a permanent assignment policy, the permanent maintenance crews were reduced from 12 men to 2 after checking written requests for maintenance over a period of time.

The form the job order takes is relatively unimportant as long as these requirements are fulfilled:

(1) A simple numbering system, so that a maintenance man can charge his time to a specific job order;
(2) Space afforded for equipment number, name, and location;
(3) Sufficient space for detailed description of the work done; and
(4) Space for signatures of the person requesting the work, person approving the work, and person performing the work.

A typical job order form is prepared in three copies. The original copy is for the repair man in charge of the repair; the duplicate is for retention in the maintenance superintendent's office; the triplicate is for the maintenance control clerk as a cost-accounting reference.

Requests for corrective maintenance must go through the control clerk. He fills out the job order and obtains the necessary approval of the order. Repair jobs costing over a fixed amount ($100–500) should be formally estimated by an engineer. This estimating helps in planning on scope, methods, types of materials, and equipment. In large jobs, time spent in proper planning of the repair will be offset by savings on errors made by the repair crew.

The first two copies of the order are given to the maintenance superintendent, the control clerk keeping the third copy in his files. The superintendent makes a rough estimate of the man-hours involved in the order and lists the materials necessary to complete the job. Then he schedules the job.

Some type of job priority must be established. Normally, the following will suffice:

(1) Repairs occasioned by breakdowns;
(2) Repairs resulting from inspection;

(3) Repairs that, if not made, will endanger workers;
(4) Repairs that, if not made, will result in loss of product or serious damage to machinery;
(5) Routine plant requests; and
(6) Alterations and/or capitalized jobs.

The original copy of the order must be placed on the schedule board. This board in small plants might be a clip board with a clip for each maintenance man. In large plants where each crew is specialized, each clip might represent one of the repair crafts.

This system provides for the best performance, and smooth and orderly flow of job orders. The status of any order can be checked quickly. The responsibility for good workmanship is established readily. It is now the job of the maintenance man to perform the work. And when it has been done, the workman signs and returns the order to the control clerk. The worker's copy is kept in a temporary file for 3 months, as a check against unsatisfactory work.

The finished cost copy of the order is returned to the maintenance superintendent so he may check against his original estimate of costs and materials. Then it is returned to the clerk for file and the superintendent's copy is either filed or destroyed.

Getting Job Costs

The foundation of every cost system is reliable cost figures. Accurate costs must be obtained from every maintenance job. While each repair job is being performed, the repairman should have his copy of the job order with him. Time on the job must be charged to the job number being performed.

No matter what type of order is in use, provision must be made for the timekeeper or clerk to reconcile the total hours spent on a job with the total hours paid to the worker each day. Space is also needed on the form to convert the total hours by each man into labor costs.

Each day the reconciled time cards are sent to the maintenance control clerk for posting of labor costs on the cost copy of the job order.

Material-costing systems vary, and degree of control must be suited to the plant. But maintenance material can be divided into two broad catagories: those materials purchased for a specific job and those—such as nuts, bolts, screws, and wire—that are used on various jobs. Cost as well as physical control can be reasonably assured if the following procedures are followed:

Materials for Specific Jobs:

(1) Order all special materials for the job number and charge to that number;
(2) Instruct vendor to mark each carton with the job order number;
(3) Segregate all special materials in the stockroom;
(4) When all necessary materials for a specific job number are received by stores, maintenance superintendent should be notified; and
(5) As invoices are received in purchasing, copies should be sent to maintenance control clerk for posting on cost copy of the job order.

Stock Items:

(1) Order stock in accordance with the plant's maximum-minimum plan;
(2) Record physical quantities on inventory form with usual "receipts", "issues", and "balance" columns; and
(3) Dollar and cents of items need not be carried.

Measuring the Achievement

A standard is necessary to determine how much the job should have cost as against the actual cost. Such comparisons are more concerned with labor costs than they are with material costs since

the latter are not hard to explain.

Standards on a large, formally estimated job are simple to check at any point in the repair. The original estimate is the final goal. Cost of making preventive maintenance inspections is also easily obtained. After repetitive schedules have been established and tried, time necessary to perform the inspection can be taken with a stop watch or from the average of several inspections.

Standard for ordinary repair work is obtained differently. These standards can not be made either accurate or detailed. If in one department there is a relationship between maintenance costs and production, standard can be set on a budgetary basis. The basis of this system may be man-hours of direct labor, units produced, or kilowatt-hours consumed. They will vary with the plant. Whatever basis is selected, it should be checked against the total maintenance-man-hours for a valid period of time.

In plants having separate maintenance crafts, this system should be worked on a craft basis. This is a necessity. If maintenance costs are "too high" in one department, information is of no value unless you know what repair crafts costs cause the misalignment. By breaking costs down by craft, budgetary information is readily available should maintenance craft work be placed on a budgetary basis in some of the departments.

Actual and standard cost figure will vary week to week, but over say a 4-week period, variation should be negligible. Weekly variations are caused by performing non-repetitive maintenance jobs. More important is the fact that as closer control is attained over maintenance expenditures the ratio between these costs and the unit of measure will decrease.

At the inception of any maintenance control system a backlog of work will be uncovered. This in itself is a good justification for the institution of such a system. With the system in operation, the backlog will disappear. Because of this, standards should be reviewed periodically—say three times during the first year of the program and twice a year thereafter.

Reporting to Management

Cost figures mentioned above are only of value when they are interpreted and applied. Three applications of the figures are important: as an equipment record, a weekly labor summary, and a monthly job progress report.

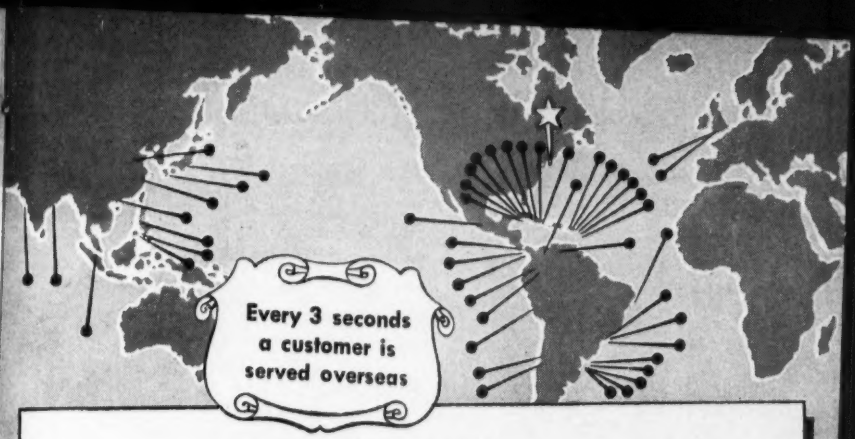
Equipment Record—Cost and type of equipment used should be entered in the equipment record. Such a record gives a valid gage to the value of equipment on review of the repair record. In one instance it was found that the repair costs on one piece of equipment ran twice the original cost of the machine in the first 3 years of operation. This record is also of value in determining depreciation costs.

Weekly Labor Summary—These reports are only useful if they are gotten to management immediately after the work week is completed—say the following Monday or Tuesday. The summary should carry a breakdown of craft-hours and costs and a breakdown of the type of maintenance for which costs were incurred. This points up crafts that are out of line and categories of work on which that time is spent.

A weekly variance column should be provided. As stated, this variation over a period of weeks should be negligible. If not, this column will call attention to the fact.

Monthly Job Progress Report—This reports backlog work, listing jobs by number and brief description. Cost data, including the estimated cost-to-date information, are helpful.

These last two reports will be invaluable in lowering over-all plant maintenance costs. But more important, they see to it that the work is done properly, thus increasing plant productive time.—Factory, S, 87.



Buying in foreign lands?

You can consummate your business transactions faster—anywhere in the world—through the facilities of The National City Bank of New York. National City maintains forty-eight branches overseas, sixty-five branches in the Greater New York area and correspondent relationships with banks in every state of the Union and in every commercially important area abroad. These facilities stand ready to provide complete, experienced round-the-world banking service wherever it may be needed.

THE NATIONAL CITY BANK OF NEW YORK

Head Office: 55 Wall Street, New York City

First in World Wide Banking

Member Federal Deposit Insurance Corporation

ARGENTINA
Buenos Aires
Flores
Plaza Once
Rosario

BRAZIL
Rio de Janeiro
Recife
(Pernambuco)
Santos
São Paulo

CANAL ZONE
Balboa
Cristobal

CHILE
Santiago
Valparaiso

CHINA
Shanghai
Tientsin

COLOMBIA
Bogota
Barranquilla
Medellin

CUBA
Havana
Cuatro Caminos
Galiano
La Lonja
Caibarien
Cardenas
Manzanillo
Matanzas
Santiago

ENGLAND
London
117, Old Broad St.
11, Waterloo Place

HONG KONG

INDIA
Bombay
Calcutta

JAPAN
Tokyo
Osaka

MEXICO
Mexico City

PERU
Lima

PHILIPPINES
Manila
Cebu
Clark Field

PUERTO RICO
San Juan
Arecibo
Bayamon
Caguas
Mayaguez
Ponce

REPUBLIC OF PANAMA
Panama

SINGAPORE

URUGUAY
Montevideo

VENEZUELA
Caracas

5 Timely McGRAW-HILL BOOKS

MECHANICS

By J. P. DEN HARTOG, Professor of Mechanical Engineering, Massachusetts Institute of Technology. 462 pages, $4.50

A new text of timely importance, in which the author covers the usual sophomore course in Engineering Mechanics, designed for two semesters: the first devoted principally to statics; the second to kinematics and dynamics. Written in a descriptive style, the text presents the subject matter in a clear and simple manner, with emphasis on fundamentals.

RADAR SCANNERS AND RADOMES—Vol. 26, M.I.T. Radiation Laboratory Series.

Edited by W. A. CADY, Head, Physics Section, U. S. Naval Ordnance Test Section, Pasadena Area; M. B. KARELITZ, Asst. Dir. of Research, General Precision Laboratory, Pleasantville, N. Y.; and L. A. TURNER, Dept. of Physics, State University of Iowa. 375 pages, $7.00

A two-part book, the first dealing with frequency-response techniques of servomechanism design, the second presenting a new design technique which depends upon minimization of the rms error with which the mechanism produces a desired result, in the presence of electrical noise and other disturbances. The approach makes fundamental use of statistical methods, which are here presented, together with necessary background material. The relation of this technique to that discussed in Part I is explored, and the discussion is illustrated with many examples.

PRACTICAL ADVERTISING PROCEDURE

Prepared by ROCHESTER INDUSTRIAL ADVERTISERS, Rochester, N. Y. 446 pages, $4.50

A pre-tested textbook for advertising classes, prepared by 50 experts in every branch of the art, with the assistance of university instructors to fill a void between existant college texts in fundamental theory and actual practice; to provide practical suitable material for use in extension-school classes; and to place advertising in its proper sphere—as one tool of selling—for those interested in practising advertising.

THERMODYNAMICS

By E. F. OBERT, Associate Professor of Mechanical Engineering and Director of the Heat Power Laboratories, Northwestern University Technological Institute. 571 pages, $5.50

A standard text for mechanical engineering students emphasizing the theoretical aspects of thermodynamics. The book presents an unusually detailed treatment of the subject, more than 500 problems for student solution and over 140 illustrative problems, carefully drawn to emphasize the method of solution.

ELECTRICAL MEASUREMENTS IN THEORY AND APPLICATION — New 4th Edition.

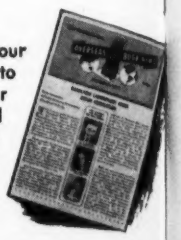
By ARTHUR WHITMORE SMITH, Professor of Physics, University of Michigan. 370 pages, $4.25

A thorough revision of a standard text, incorporating many changes to clarify the explanations and present improved methods. The meter-kilogram-second (M.K.S.) system has been used for the definitions of the units of the electrical and magnetic quantities. New methods have been added, especially for the measurement of capacitance and inductance.

Keep Posted on

new McGraw-Hill books in your specialized field. Ask us to send you the name of our nearest stockist who will send you a free bi-monthly copy of our informative

OVERSEAS BOOK NEWS



McGRAW-HILL BOOK COMPANY

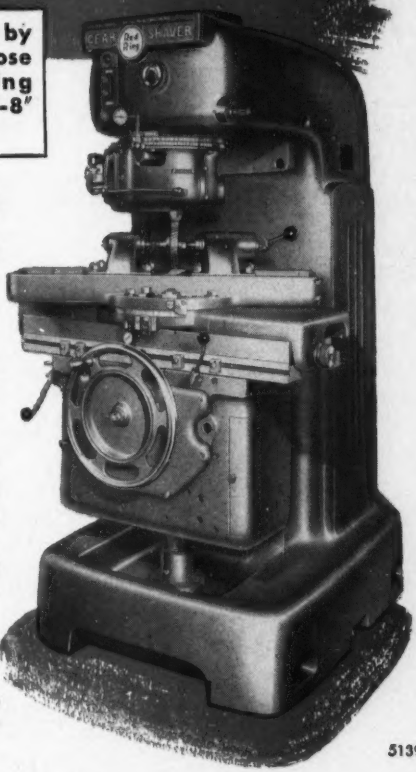
330 West 42nd Street

New York 18, N. Y., U.S.A.

NEW GEAR SHAVING MACHINE

Has far greater Production Possibilities

Gears may be shaved by any method you choose on the new Red Ring Universal Model GCV-8" and 12".



5139

Conventional Shaving—You can shave wide face gears by the conventional method of shaving, that is, when the gear is reciprocated across the cutter and parallel to its axis.

Diagonal Shaving—Or, you can shave the narrower face gears diagonally at much higher production rates and with considerably less cutter wear and less effort by the operator.

Elliptoid Tooth Form—You can give the gear teeth the perfect Elliptoid form (crowning by rocking the table) while they are being shaved by either method mentioned above and without the necessity of using specially formed cutters. Special cutters may be used, however, if desired.

Taper Shaving—Likewise, gears may be taper-shaved by either the conventional or the diagonal method. This new machine is faster in operation and easier to load and unload than any of its predecessors.

Write for descriptive bulletin giving all the details of the new Red Ring Universal and its operation.

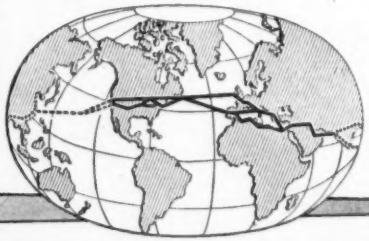
NATIONAL BROACH AND MACHINE CO.
5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

A dozen reasons for shipping by TWA Air Cargo

Why ship by air? Because it is economical . . . fast . . . dependable. TWA Air Cargo (Trans World Airline) offers shippers many advantages:

1. Saves time . . . days, weeks, even months. Shipments quickly reach destinations throughout the world!
2. Reduces perishable spoilage.
3. Provides opportunity to sell in peak markets.
4. Reduces warehousing and in-transit inventories.
5. Increases turnover.
6. Enables shipper to beat competition.
7. Opens up new markets . . . increases sales.
8. Lowers insurance costs.
9. Fills re-orders quickly.
10. Gives added sales value of "fresh" stock.
11. Lessens risk of pilferage.
12. Simplifies crating and packing.



TWA SERVES:

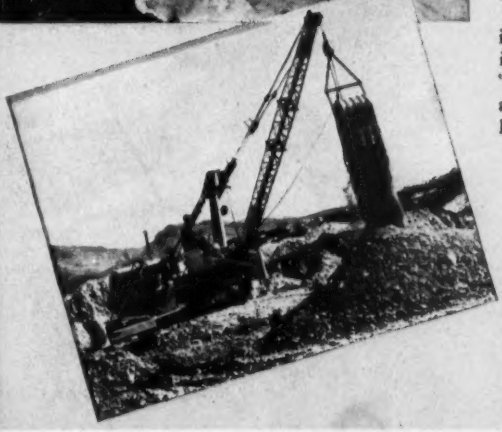
ALGERIA	INDIA	PALESTINE
AMERICA	IRAQ	PORTUGAL
EGYPT	IRELAND	SAUDI ARABIA
FRANCE	ITALY	SPAIN
GREECE	NEWFOUNDLAND	SWITZERLAND
	TUNISIA	

TWA International All-Cargo flights link world capitals with principal cities of U.S.A. Cargo agent aboard plane protects shipment . . . he assures safe arrival. You can reserve space . . . obtain confirmation of deliveries upon arrival . . . send consignments collect. All TWA flights carry Air Cargo. Ask your International freight forwarder for complete information . . . or contact the nearest TWA office today!

TWA

TRANS WORLD AIRLINE

U.S.A. · EUROPE · AFRICA · ASIA



HYSTAWAY

eats up work fast... more swings per hour

Good News Gets Around... Among construction men it's about the speedy, efficient earth moving performance of a Hystaway mounted on a D8, D7, or D6 "Caterpillar" track-type tractor. Provides tractor mobility *plus* the dragline, clamshell and crane features of the Hystaway unit.

Hundreds of Hystaways are in use on new and used "Caterpillar" track-type tractors.

Hystaway can be removed in one hour; installed again in two hours. Ask your "Caterpillar" distributor for a demonstration. Write for literature.

HYSTER COMPANY

2902-64 N.E. Clackamas Street
PORTLAND 8, OREGON, U.S.A.

WAUKESHA ENGINES

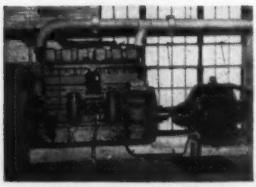
FOR HEAVY DUTY WHEREVER DEPENDABLE POWER IS REQUIRED

HANDLING, MOVING MATERIALS

INDUSTRIAL APPLICATIONS

POWERING FARM MACHINERY

DRIVING IRRIGATION PUMPS



GENERATING ELECTRICITY

● Since 1906, Waukesha Motor Company has devoted research, engineering and manufacturing skills and experience to the output of internal combustion engines for heavy duty exclusively. Today Waukesha Engines, ranging from 5 to over 400 hp, furnish more than 5,000,000 hp to serve all branches of industry, agriculture, mining and engineering.

These engines operate on every available modern fuel—gasoline (petrol), fuel oils, diesel oils, natural or producer gas, kerosene (paraffin), tractor distillates, alcohol. The complete Waukesha line includes C. I. Diesel Engines, spark-ignition-injection oil engines (Hesselman type), and carbureted engines.

THE WAUKESHA RAILWAY AIR CONDITIONING UNIT is engine-driven and fully independent, operating automatically on cooling demand. Carriages and coaches of 31 major railway systems of the U. S., Canada and Mexico are comfort cooled by Waukesha.

Waukesha representatives in key cities of overseas territories may be consulted for engineering advice.

WAUKESHA MOTOR CO.

Waukesha, Wis., U. S. A.

Cables: Motor - Waukeshawis

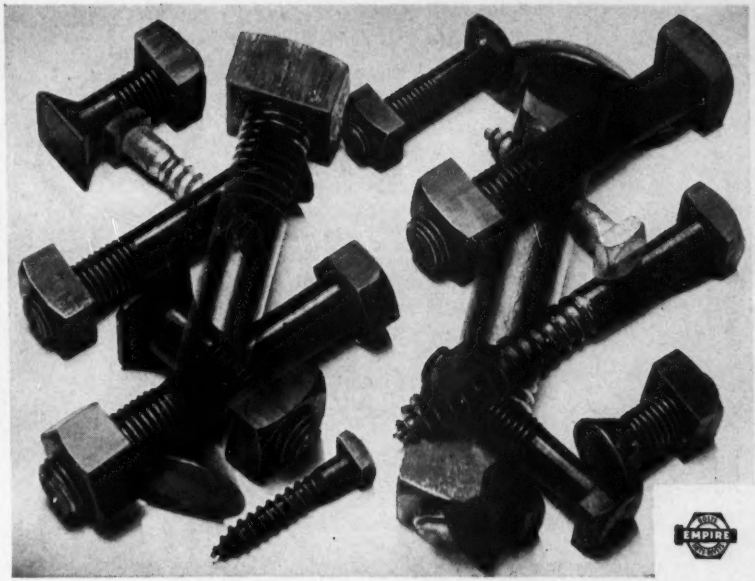
FURNISHING GRAVEL PIT POWER

DRIVING AIR COMPRESSORS (I-R)

HEAVY HAULING, LOGGING

HEAVY HAULING, MINING

PASSENGER BUS OPERATION



RB&W EMPIRE FASTENERS...choice of leaders

In many of the world's greatest industrial plants, the desire of production men for bolts, nuts, screws and other fasteners having utmost strength of product, maximum accuracy of thread, and high-quality finish . . is fulfilled by the specification of RB&W EMPIRE.

This is the purchasing practice of such firms as General Motors, American Car and Foundry Company, American Locomotive Company, and John Deere and Company — known all over the world for the high quality of their products.

Experience has proved to them that RB&W's 103 years of fastener experience and its complete manufacturing facilities are their best guarantee of satisfactory fastener performance.

GET IN TOUCH WITH THESE REPRESENTATIVES

EGYPT — Shalon Brothers & Co., P. O. Box 716, Cairo

FAR EAST — Muller & Phipps, 1 Park Ave., New York, New York

GREECE — Nicholas John Coroneos, Stoa Rizari, Piraeus

IRELAND — American Exports Co., 30 South King St., Dublin

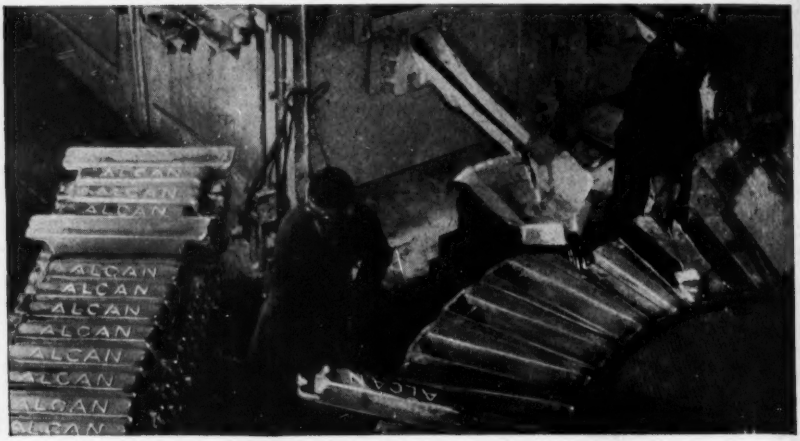
NEWFOUNDLAND — James G. Crawford, St. Johns

PALESTINE — Efco Agency, P. O. Box 1181, Tel-Aviv

SOUTH AFRICA — Arthur E. Harris, P. O. Box 1199, Johannesburg

TURKEY — Leon Bernardin Marco, Posta Kutusu 85, Istanbul

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY



HERE...ALUMINUM GETS STARTED

in the right direction!

Starting from casting "turn-tables" like these, Alcan aluminum ingots move out to meet a world-wide pattern of increasing demand. At Arvida, the power resources of Canada's Saguenay River are concentrated on aluminum production. Energy at the million-horsepower level acquires permanence in the form of these pure, virgin-metal bars.

The *Aluminium Limited* group of companies is able to follow through on Arvida's ingot production with technical contributions to effective fabrication and use. Research and practical experience in its own laboratories and plants often help users to "get started in the right direction" as well.

Nowhere in the Western Hemisphere is remote from start-to-finish knowledge of aluminum. Though shortages limit today's supply, Aluminum Import Corporation is ready to help you plan ahead for more widespread usage tomorrow. *Aluminum Import Corporation, 620 Fifth Avenue, New York 20, N. Y. — Av. Ing. Luis A. Huergo, 1279, Buenos Aires — Rua da Quitanda, 96, Sao Paulo.*

ALUMINUM INGOT • ALLOYS
SHEET • PLATE • COILS
DISCS • ROOFING • SIDING
SHAPES • WIRE • ROD
CABLE • TUBING • CONDUIT
FOIL • PIGMENTS • RIVETS
NAILS • CHEMICALS

Cable address: **ALIMPORT**

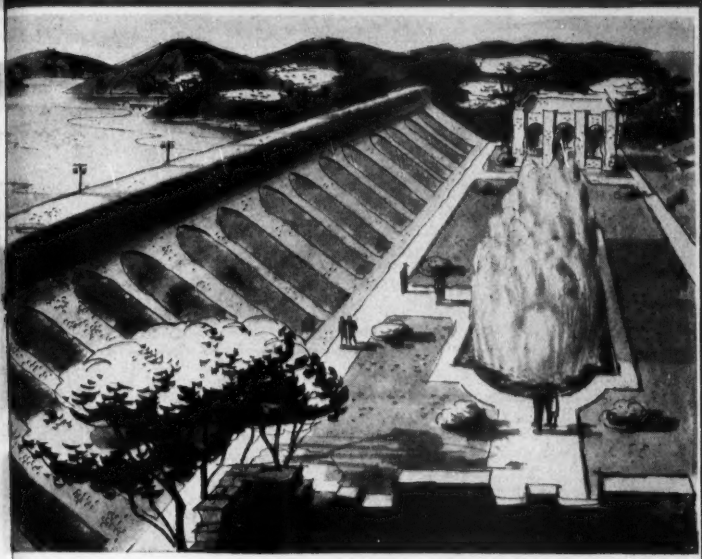
ALUMINUM IMPORT CORPORATION

Distributing unit, in the Western Hemisphere, of the ALUMINIUM LIMITED group of companies. Offices and agents in 30 cities.

***Aluminum* FOR THE AMERICAS — backed by world-wide resources**

ALLIS-CHALMERS

WORLD'S LARGEST LINE OF MAJOR INDUSTRIAL EQUIPMENT



Fountainhead of Good Living . . .

HERE water for cities and farmlands is stored behind huge concrete dams . . . purified in aeration fountains . . . sped on its way by mighty pumps. Here again is an example of science and industry contributing to your good living.

Behind the construction and operation of water-works throughout the world are machines and equipment by Allis-Chalmers . . . crushers, grinders and kilns to make cement for buildings, dams and sluiceways . . . giant centrifugal pumps . . . complete equipment for generating electric power and light.

In *every* basic industry—public works, textiles, food—production men find they can depend on Allis-Chalmers products for low-cost operation, long-life efficiency.

For your needs, consult our representative in your country, or write

ALLIS-CHALMERS MANUFACTURING CO.
General Machinery Division,
Milwaukee 1, Wisconsin, U. S. A.

Electrical Equipment

Steam, Hydraulic Generating Units, Condensers

Crushing, Cement and Mining Machinery

Centrifugal Pumps

Flour and Sawmill Equipment

Serving All Industry FOR MORE THAN A CENTURY

ADVERTISERS IN THIS ISSUE

ALLIS-CHALMERS MANUFACTURING CO..... 71
Compton Advertising, Inc.

ALUMINUM IMPORT CORPORATION..... 70
G. M. Basford Co.

AMERICAN CHAIN & CABLE COMPANY, INC. 2
National Export Advertising Service, Inc.

CHASE NATIONAL BANK OF THE CITY OF N. Y. 4
Albert Frank-Guenther Law, Inc.

CHRYSLER EXPORT CORPORATION....4th Cover
Ross Roy, Inc.

CLARK EQUIPMENT COMPANY..... 8
Gebhardt & Brockson, Inc.

FAIRBANKS MORSE & CO., INC..... 9
The Buchen Company

HYSTER COMPANY 67
Simon & Smith Advertising

INTERNATIONAL GENERAL ELECTRIC CO... 1
Grant Advertising, Inc.

R. K. LE BLOND MACHINE TOOL CO..... 13
Perry-Brown, Inc.

MONSANTO CHEMICAL CO..... 14
Gardner Advertising Co.

McGRAW-HILL BOOK COMPANY..... 64

NATIONAL BROACH & MACHINE COMPANY. 65
Witte & Burden Advertising

NATIONAL CITY BANK OF NEW YORK..... 63
Batten, Barton, Durstine & Osborn, Inc.

PFAUDLER COMPANY, THE..... 10
Charles Rumrill & Company, Inc.

REMINGTON RAND, INC..... 5
Leeford Advertising Agency, Inc.

RUSSELL, BURDSALL & WARD BOLT & NUT CO. 69
James Thomas Chirurg Co.

STANDARD OIL COMPANY, (NEW JERSEY) .....2nd Cover
McCann-Erickson Corp.

F. J. STOKES MACHINE CO.....3rd Cover
John Mather Lupton Co., Inc.

TAYLOR INSTRUMENT COMPANIES..... 6
Batten, Barton, Durstine & Osborn, Inc.

TRANS-WORLD AIRLINE 66
Irwin Vladimir & Co., Inc.

WAUKESHA MOTORS 68
John G. Robel, Export Consultant

WESTINGHOUSE INTERNATIONAL CO..... 7
Fuller & Smith & Ross, Inc.

Publications Digested:

McGraw-Hill Publishing Co., 330 West 42nd Street, New York 18, New York

American Machinist • *Aviation Week* • *Bus Transportation* • *Business Week* • *Chemical Engineering* • *Coal Age* • *Construction Methods* • *Electrical Construction & Maintenance* • *Electrical Merchandising* • *Electrical West* • *Electrical Wholesaling* • *Electrical World* • *Electronics* • *Engineering & Mining Journal* • *Engineering News-Record* • *Factory Management and Maintenance* • *Food Industries* • *Industrial Distribution* • *Machinist (London Office)* • *Nucleonics* • *Operating Engineer* • *Pharmacy International* • *Power* • *Product Engineering* • *Science Illustrated* • *Textile World* • *The American Automobile [Overseas Edition]* • *Welding Engineer.*

Chilton Company, Chestnut and 56th Streets, Philadelphia 39, Pa.

Automotive Industries • *Boot & Shoe Recorder* • *Commercial Car Journal* • *Department Store Economist* • *Distribution Age* • *Hardware Age* • *Hardware World* • *Motor Age* • *The Iron Age* • *The Jewelers' Circular-Keystone* • *The Optical Journal & Review of Optometry* • *The Spectator*

Modern Packaging Corp., 122 East 42nd Street, New York 17, New York

Modern Packaging

Modern Plastics, Inc., 122 East 42nd Street, New York 17, New York

Modern Plastics

Petroleum Publishing Co., 211 South Cheyenne Ave., Tulsa 1, Okla.

The Oil and Gas Journal

The Penton Company, Inc., Penton Building, Cleveland 13, Ohio

Steel, The Foundry

McGraw-Hill World News Bureaus: London, Paris, Berlin, Moscow, Tokyo, Bombay, Melbourne, Buenos Aires, Rio de Janeiro, and 60 other industrial cities.

COPYRIGHTED, 1948 by McGraw-Hill International Corp., 330 West 42nd Street, New York 18, New York. Reproduction of items in full or part without written permission prohibited.

ASK STOKES

For Pharmaceutical Equipment and Complete Advisory Service

FOR fifty years we have built equipment to meet the needs of pharmaceutical manufacturers throughout the world. Stokes equipment is simple, durable, easily operated, and easily cleaned.

If you have problems in tablet making, preserving biologicals, extracting and concentrating drugs, manufacturing fine chemicals, we have the facilities and experience to help you.

For example, Stokes has helped hundreds of manufacturers to produce better tablets . . . developed the first commercial equipment for freeze-drying of blood plasma, penicillin, biologicals, equipment now in use in nearly two score countries. If you are interested in large or small-scale manufacture, we can assist you in choice of equipment and plant layout.

Stokes supplies complete plants for making tablets, soft gelatine capsules, and pharmaceuticals . . . also makes Plastic Molding Presses, Industrial Tablet Machines, Vacuum Pumps and Gages, High Vacuum Processing equipment, Evaporators, Tube Fillers, Water Stills, Special Machinery.

F. J. Stokes Machine Co.
754 Drexel Building,
Philadelphia, Pa.

FJS

Agents throughout the World

Soft capsules, aspirin tablets, blood plasma, pollen extract, penicillin, distilled water, tube-packed product . . . Stokes machines had a part in all.

STOKES KNOWS HOW

These parts need no machining!

They are *Oilite* machine parts. And they are *pressed* from powdered metal—not machined!

No wonder Oilite parts are more economical for you to use! Since they require no machining, you have no tooling costs. Nor must you invest money or floor space in machine tools.

Oilite parts can be pressed to *your exact specifications.* Size or shape is no obstacle. You can have them pressed from powdered bronze, brass, copper, iron, aluminum and alloys. And you can have self-lubrication where needed!

You can also get Oilite self-lubricating bearings and Oilite filters. Cored and bar stock, strip or plate stock are available for emergency or experimental use.

Investigate Oilite for the answer to *your* problems. Write today.

★ ★ ★

NOTICE TO DISTRIBUTORS: A few highly desirable territories are now open for Oilite products.

CHRYSLER EXPORT OILITE

DIVISION OF CHRYSLER CORPORATION
DETROIT 31, MICHIGAN

POWDERED METAL
PRODUCTS